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TREES AND SHRUBS OF MEXICO

(OXALIDACEAE–TURNERACEAE)

By PAUL C. STANDLEY

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TREES AND SHRUBS OF MEXICO.[1]

By Paul C. Standley.

65. OXALIDACEAE. Wood-sorrel Family.

One other genus, *Biophytum*, occurs in Mexico.

1. OXALIS L. Sp. Pl. 433. 1753.

Low shrubs or sometimes herbs, pubescent; leaves alternate, pinnately 3-foliolate; flowers small, perfect, usually cymose; sepals 5, inferior; petals 5 (yellow in the species here listed), deciduous; stamens 10, the filaments united into a tube below; styles filiform or subulate; fruit a small oblong or columnar capsule, 5-celled.

Numerous herbaceous species are found in Mexico. The name "socoyol" (from the Nahuatl *xocoyolli*, "sorrel") is applied to some species.

Longer filaments not appendaged ---------- **1. O. camporum.**
Longer filaments appendaged on the back.
  Leaflets acute or acuminate.
    Leaflets linear or linear-oblong ---------- **2. O. angustifolia.**
    Leaflets ovate or lance-ovate ---------- **3. O. sepium.**
  Leaflets, at least most of them, emarginate at the apex.
    Capsule glabrous ---------- **4. O. yucatanensis.**
    Capsule pubescent on the angles ---------- **5. O. neaei.**

1. Oxalis camporum T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 377. 1913.

Veracruz; type from Baños del Carrizal.

Leaflets 2.5 cm. long and 1 cm. wide or smaller, pubescent.

2. Oxalis angustifolia H. B. K. Nov. Gen. & Sp. 5: 249. 1822.

Lotoxalis angustifolia Rose, Contr. U. S. Nat. Herb. 10: 115. 1906.

Known only from the type locality, near La Venta del Peregrino.

Plants about 20 cm. high; leaflets 1.5 to 2.5 cm. long, glabrous; petals twice as long as the sepals.

3. Oxalis sepium St. Hil. Fl. Bras. Merid. 1: 111. 1825.

Oxalis acuminata Schlecht. Linnaea 5: 224. 1830.

Oxalis lindenii Turcz. Bull. Soc. Nat. Moscou 31[1]: 429. 1858.

Lotoxalis sepium Small, N. Amer. Fl. 25: 48. 1907.

Guerrero and Oaxaca to Veracruz. Central America, West Indies, and South America; type from Brazil.

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[1] The first installment of the Trees and Shrubs of Mexico, comprising the families Gleicheniaceae to Betulaceae, was published as Part 1 of Volume 23, Contributions from the U. S. National Herbarium, pp. 1–170, October 11, 1920; the second installment, comprising the families Fagaceae to Fabaceae, as Part 2, pp. 171–515, July 14, 1922.

Slender shrub, sometimes 2 meters high, with reddish brown branches; leaflets mostly 2 to 4 cm. long, pubescent; sepals 3 to 4 mm. long, the petals twice as long; capsule 5 to 7 mm. long.

4. **Oxalis yucatanensis** (Rose) Standl.

Lotoxalis occidentalis Rose, Contr. U. S. Nat. Herb. **10**: 115. 1906. Not *Oxalis occidentalis* Knuth, 1915.

Lotoxalis yucatanensis Rose, Contr. U. S. Nat. Herb. **10**: 116. 1906.

Sinaloa to Guerrero and Yucatán; type from Yucatán. Central America.

Slender shrub, rarely more than 30 cm. high; leaflets 1 to 2.5 cm. long, glabrous or sparsely pubescent beneath; sepals 4 to 5 mm. long; capsule 6 to 8 mm. long.

5. **Oxalis neaei** DC. Prodr. **1**: 691. 1824.

Oxalis tephrodes Turcz. Bull. Soc. Nat. Moscou **31**[1]: 427. 1858.

Oxalis psilotrichia Turcz. Bull. Soc. Nat. Moscou **31**[1]: 427. 1858.

Oxalis fasciculata Turcz. Bull. Soc. Nat. Moscou **32**[1]: 272. 1859.

Lotoxalis neaei Rose, Contr. U. S. Nat. Herb. **10**: 115. 1906.

Guerrero to Veracruz and Chiapas; type from Acapulco, Guerrero. Central America and South America.

Slender shrub, a meter high or less, or often herbaceous; leaflets 1 to 3 cm. long, pubescent on both sides; sepals 3 to 4 mm. long; capsule 4 to 6 mm. long.

66. ERYTHROXYLACEAE. Coca Family.

1. ERYTHROXYLON L. Syst. Nat. ed. 10. 1035. 1759.

Reference: Britton, N. Amer. Fl. **25**: 59–66. 1907.

Glabrous trees or shrubs; leaves alternate, entire, thin, stipulate, petiolate; flowers small, solitary, or fasciculate in the leaf axils; fruit a small drupe.

Erythroxylon coca Lam., of South America, is the well-known coca plant, from which cocaine is obtained. It is cultivated extensively in Peru and Bolivia.

Stipules large, conspicuously striate; leaves acute.
- Calyx lobes ovate ---------- **1. E. tabascense.**
- Calyx lobes orbicular-ovate ---------- **2. E. lucidum.**

Stpules small, not striate; leaves rounded or very obtuse at apex.
- Leaves large, usually 3.5 to 7 cm. long.
  - Pedicels filiform, 5 to 12 mm. long ---------- **3. E. havanense.**
  - Pedicels stout, 4 to 6 mm. long ---------- **4. E. mexicanum.**
- Leaves small, all or most of them less than 3 cm. long.
  - Leaves broadly ovate ---------- **5. E. compactum.**
  - Leaves ovate to broadly oval, broadest at or below the middle.
    - Branchlets glaucescent; pedicels 5 to 7 mm. long ---------- **6. E. pringlei.**
    - Branchlets not glaucescent; pedicels 2 to 4 mm. long ---------- **7. E. pallidum.**

1. **Erythroxylon tabascense** Britton, N. Amer. Fl. **25**: 66. 1907.

?*Erythroxylon ellipticum* Ramírez; Villada, Naturaleza **3**: 53. *pl. 4.* 1898. Not *E. ellipticum* R. Br. 1863.

Tabasco, and probably in Veracruz; type from San Sebastián, Tabasco.

Shrub with brown branches; leaves 8 to 14 cm. long; petals 1 to 3.5 mm. long. "Zapotillo" (Veracruz, *Ramírez*).

The infusion of the leaves is said to be used as a beverage.

2. **Erythroxylon lucidum** H. B. K. Nov. Gen. & Sp. 5: 179. 1822.

Reported from Mexico, but no specimens seen by the writer. Costa Rica to Colombia; type from Colombia.

Small tree; leaves 8 to 15 cm. long.

3. **Erythroxylon havanense** Jacq. Enum. Pl. Carib. 21. 1760.

Oaxaca and Veracruz. Cuba; type from Havana.

Shrub or small tree, 6 meters high or less; leaves 3 to 8 cm. long, pale beneath; flowers white; fruit 4 to 7 mm. long, orange or yellow.

4. **Erythroxylon mexicanum** H. B. K. Nov. Gen. & Sp. 5: 178. 1822.

Sonora to Tamaulipas, Veracruz, and Guerrero; perhaps also in Yucatán; type from Chilpancingo, Guerrero.

Shrub, 1.5 to 3 meters high; leaves 3 to 7 cm. long, pale beneath; fruit 6 to 10 mm. long. "Pata de pájaro" (Sinaloa).

5. **Erythroxylon compactum** Rose, Contr. U. S. Nat. Herb. 8: 313. 1905.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Shrub, 3 meters high or less; leaves mostly 1 to 1.5 cm. long; flowers mostly solitary.

This and the next species are very closely related.

6. **Erythroxylon pringlei** Rose, Contr. U. S. Nat. Herb. 8: 314. 1905.

Known only from the type locality, near Iguala, Guerrero.

Shrub or small tree, 3.5 to 4.5 meters high; leaves 1.5 to 3 cm. long; fruit red, 7 to 8 mm. long.

7. **Erythroxylon pallidum** Rose, Contr. U. S. Nat. Herb. 8: 314. 1905.

Vicinity of the type locality, San Juan Capistrano, Zacatecas.

Shrub; leaves 2 to 3 cm. long.

67. ZYGOPHYLLACEAE. Lignum-vitae Family.

Shrubs or trees, unarmed, often strong-scented and resinous; leaves opposite or alternate, simple, digitate, or pinnate, the leaves or leaflets entire; flowers perfect, regular or nearly so; sepals 5, free, usually imbricate; petals 5; stamens twice as many as the petals; fruit a capsule, often splitting into several carpels.

Leaves mostly opposite, digitate or even-pinnate.
- Leaves digitate, usually 3 or 5-foliolate; flowers pink or purplish. **1. FAGONIA.**
- Leaves even-pinnate; flowers yellow, blue, or violet.
  - Leaflets 2; petals yellow ---------- **2. COVILLEA.**
  - Leaflets more than 2; petals blue or violet.
    - Stamens with scalelike appendages at base; stipules persistent. **3. PORLIERIA.**
    - Stamens not appendaged; stipules deciduous ---------- **4. GUAIACUM.**

Leaves mostly alternate, odd-pinnate or simple.
- Fruit covered with long straight hairs; leaves simple, linear or oblanceolate.
  - Flowers yellow ---------- **5. SERICODES.**
- Fruit tomentose or puberulent; leaves pinnate or, if simple, oval.
  - Flowers purplish; petals 4; leaves pinnate ---------- **6. MORKILLIA.**
  - Flowers yellowish; petals 5; leaves usually simple ---------- **7. VISCAINOA.**

1. FAGONIA L. Sp. Pl. 386. 1753.

REFERENCE: Standley, Proc. Biol. Soc. Washington **24**: 243–250. 1911.

Small shrubs or herbs; leaves opposite, digitately 1 to 7-foliolate, the leaflets small, entire; flowers small, solitary, pink or purplish; fruit small, composed of 5 carpels.

Most of the species scarcely deserve to be classed as shrubs.

Leaves wanting; stipules triangular-subulate, 1 mm. long or shorter; sepals persistent ---------- **1. F. scoparia.**
Leaves present; stipules subulate, usually much more than 1 mm. long; sepals caducous.
  Leaflets 5 or 7 ---------- **2. F. palmeri.**
  Leaflets 3.
    Ovary glabrous ---------- **3. F. laevis.**
    Ovary and mature fruit pubescent.
      Leaflets glabrous.
        Stems densely glandular ---------- **4. F. viscosa.**
        Stems scaberulous, not at all glandular ---------- **5. F. californica.**
      Leaflets pubescent, often glandular.
        Pedicels shorter than the fruit.
          Leaflets 8 to 13 mm. long; stems densely glandular. **6. F. pachyacantha.**
          Leaflets 3 to 10 mm. long; stems sparsely or often scarcely at all glandular ---------- **7. F. barclayana.**
        Pedicels longer than fruit.
          Leaflets linear; stipules 4 to 5 mm. long; stems sparsely pilose. **8. F. insularis.**
          Leaflets lanceolate or linear-oblong; stipules 2 mm. long; stems sparsely scaberulous ---------- **9. F. rosei.**

1. Fagonia scoparia T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 181. 1911.

Known only from the type locality, Cerro del Macho, Coahuila.

Slender erect shrub, about 30 cm. high, leafless; petals purplish pink, 5 mm. long.

2. Fagonia palmeri Vasey & Rose, Contr. U. S. Nat. Herb. **1**: 82. 1890.

Baja California; type from Santa Rosalia.

Densely branched undershrub, forming clumps about 45 cm. high; leaflets linear, 3 to 10 mm. long; petals pinkish.

3. Fagonia laevis Standl. Proc. Biol. Soc. Washington **24**: 249. 1911.

Northern Baja California. Southern California and Arizona; type from Yuma, Arizona.

Plants suffrutescent. decumbent, densely branched, glabrous; leaflets 2 to 8 mm. long.

4. Fagonia viscosa Rydb. N. Amer. Fl. **25**: 104. 1910.

Sonora (type locality) and Baja California. Southern California.

Leaflets 8 to 15 mm. long, 3 to 8 mm. wide; petals purple, 6 to 8 mm. long.

5. Fagonia californica Benth. Bot. Voy. Sulph. 10. 1844.

Baja California; type from Magdalena Bay. Southern California to Utah.

Densely branched, suffrutescent, about 30 cm. high; petals 5 to 8 mm. long.

6. Fagonia pachyacantha Rydb. N. Amer. Fl. **25**: 105. 1910.

Known only from the type collection, from somewhere in Baja California.

Suffrutescent, 30 to 60 cm. high; leaflets linear, 8 to 15 mm. long; petals 6 to 8 mm. long.

7. **Fagonia barclayana**[1] (Benth.) Rydb. N. Amer. Fl. **25**: 104. 1910.
Fagonia californica barclayana Benth. Bot. Voy. Sulph. 10. 1844.
Baja California; type from Magdalena Bay.
Leaflets 8 to 20 mm. long; petals 5 mm. long; fruit 4 to 5 mm. long.

8. **Fagonia insularis** Standl. Proc. Biol. Soc. Washington **24**: 247. 1911.
Known only from Carmen Island, Baja California.
Leaflets 1 to 9 mm. long; petals 5 mm. long; fruit 3 to 4 mm. long.

9. **Fagonia rosei** Standl. Proc. Biol. Soc. Washington **24**: 247. 1911.
Known only from the type locality, Tiburón Island, Baja California.
Leaflets 2 to 3 mm. long; petals purplish, 7 mm. long.

2. COVILLEA[2] Vail, Bull. Torrey Club **22**: 229. 1895.

1. **Covillea tridentata** (DC.) Vail, Bull. Torrey Club **26**: 302. 1899.
Zygophyllum tridentatum DC. Prodr. **1**: 706. 1824.
Larrea mexicana Moric. Pl. Nouv. Amer. 71. 1839.
Larrea glutinosa Engelm. in Wisliz. Mem. North. Mex. 93. 1848.
Larrea tridentata Coville, Contr. U. S. Nat. Herb. **4**: 75. 1893.
Baja California and Sonora to Tamaulipas, Querétaro, and Durango. Western Texas to Utah and southern California.

Strong-scented shrub, 1 to 3.5 meters high; leaves opposite, persistent, composed of 2 oblong to obovate leaflets, these oblique, united at base, 5 to 10 mm. long; flowers solitary, the petals yellow, 8 to 10 mm. long; fruit of 5 carpels, densely pilose with long hairs. Mostly generally known as "gobernadora;" "hediondilla" (Sonora, New Mexico); "falsa alcaparra" (Sonora, San Luis Potosí, *Ramírez*); "guamis" or "huamis" (San Luis Potosí, Chihuahua); "hediondo" (California).

The creosote bush is one of the most characteristic shrubs of the dry plains of northern Mexico, often covering wide areas to the exclusion of most other woody plants. The flower buds, pickled in vinegar, are said to be eaten like capers. The plant is much used in domestic medicine, especially for rheumatism, a decoction of the leaves being employed for baths or fomentations. The decoction is said, also, to have remarkable antiseptic properties, and is applied to bruises and sores. It is taken internally for gastric disturbances and for venereal diseases. A reddish brown lac is often deposited upon the branches by a small scale insect. This lac is used in some parts of Mexico for dyeing leather red, and the Coahuilla Indians of California employ it as cement. The same Indians use a decoction of the plant for intestinal complaints and for tuberculosis. The Pima Indians of Arizona drink a decoction of the leaves as as emetic, and apply the boiled leaves as poultices to wounds and sores.

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[1] George Barclay was a gardener at Kew, who accompanied H. M. S. *Sulphur* for the purpose of making botanical collections.

[2] Named for Frederick Vernon Coville (1867–), Curator of the U. S. National Herbarium. Mr. Coville was botanist of the U. S. Death Valley Expedition of 1891, and published a volume dealing with the botanical features of that region (Contr. U. S. Nat. Herb. **4**), and he has published many other papers upon a wide range of botanical subjects. He made a collection of plants in Sonora in 1903.

3. PORLIERIA Ruiz & Pav. Fl. Peruv. Chil. Prodr. 55. 1794.

1. Porlieria angustifolia (Engelm.) A. Gray, Pl. Wright. 1: 28. 1852.

Guaiacum angustifolium Engelm. in Wisliz. Mem. North Mex. 113. 1848.

Coahuila to Tamaulipas; type from Parras, Coahuila. Southwestern Texas.

Shrub or small tree, sometimes 7 meters high, with a trunk 25 cm. in diameter, the branches stout, crooked; leaves pinnate, persistent, the leaflets 8 to 12, linear, 1.5 cm. long or shorter; flowers 1 to 2 cm. broad, sweet-scented, purple; wood hard, compact, taking a fine polish, the heartwood dark brown, the sapwood yellow, the specific gravity about 1.10. "Guayacán" (Coahuila, Tamaulipas, Texas).

The bark of the roots is sometimes made into balls and sold in the markets as a kind of "amole"; it is valued for washing woolen goods, since it does not fade the colors, and is esteemed also as a disinfectant. A decoction of the wood or bark is employed in domestic medicine as a sudorific and vascular stimulant, especially in rheumatism and venereal diseases; it is reputed to be used as an emmenagogue. The durable wood is used for fence posts and other purposes. Known in Texas as "soap-bush."

4. GUAIACUM L. Sp. Pl. 381. 1753.

Trees or shrubs; leaves opposite, abruptly pinnate, the leaflets few, thick, entire, unequal; flowers large and showy, blue or purple; fruit an angled capsule.

Guaiacum officinale L., the lignum-vitae, has been reported from Mexico, but probably incorrectly.

Leaflets broadly oblong or obovate, usually 8 to 15 mm. wide. **1. G. sanctum.**
Leaflets linear or linear-oblong, usually 3 to 7 mm. wide.
Ovary pubescent.....**2. G. palmeri.**
Ovary glabrous.....**3. G. coulteri.**

1. Guaiacum sanctum L. Sp. Pl. 382. 1753.

Guaiacum verticale Orteg. Hort. Matr. Dec. 93. 1798.

Yucatán and probably in Tabasco; perhaps also in Veracruz. West Indies and southern Florida; type from Porto Rico.

Tree, sometimes 10 meters high, the trunk short, the bark thin, pale or white; leaflets 4 to 10, 2 to 3.5 cm. long, glabrous; petals 7 to 11 mm. long; fruit 1.4 to 1.7 cm. long; wood resinous, light yellow, becoming green on exposure, very hard, with a characteristic odor, the specific gravity about 1.15. "Guayacán."

This species has been reported from many other parts of Mexico, apparently because it has been confused with *G. coulteri*. The wood is used for railroad ties and other purposes.

Both *G. sanctum* and *G. officinale* L., the latter a West Indian species, are official in the U. S. Pharmacopoeia. The extract of the wood, which is known as "lignum-vitae," has stimulant and diaphoretic properties. It was introduced into Europe as early as 1508 by the Spaniards, who had learned that it was used by the Indians as a remedy for syphilis. It was long highly esteemed as a remedy for syphilitic affections, and for gout, rheumatism, scrofula, and cutaneous diseases, but it is now believed to have no distinct influence upon such diseases. The resin also is employed, being stimulant, alterative, diaphoretic, and in large doses purgative. The bark and wood contain saponin.

One of the species of *Guaiacum* is illustrated by Hernández and treated[1] at length in a chapter entitled "De Hoaxacan, seu Ligno Sancto."

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[1] Thesaurus 62–65. 1651.

2. Guaiacum palmeri Vail, N. Amer. Fl. **25**: 107. 1910.

Dry plains and hills, Sonora and Sinaloa; type from Guaymas, Sonora.

Shrub or small tree; leaflets 4 to 10, 0.8 to 2.2 cm. long; petals blue, about 1.5 cm. long; fruit 1 to 1.5 cm. long.

It is probable that this plant is only a form of *G. coulteri.*

3. Guaiacum coulteri A. Gray, Mem. Amer. Acad. II. **5**: 312. 1855.

Guaiacum planchoni A. Gray; Vail & Rydb. N. Amer. Fl. **25**: 107. 1910.

Sonora to Oaxaca; type collected between Rayón and Ures, Sonora.

Shrub or small tree, 1 to 12 meters high, with crooked branches; leaflets 6 to 10, 1 to 2.5 cm. long, glabrous or nearly so; flowers fragrant, the petals blue or violet, 1 to 1.5 cm. long; fruit about 1.5 cm. long. Known throughout its range as "guayacán;" "árbol santo" (Puebla, *Ramírez*); "palo santo" (Oaxaca, Jalisco); "matlaquahuitl" (Nahuatl, *Ramírez*); "yaga-na" (Oaxaca, Zapotec, *Reko*); "yutnu-tandaa" (Oaxaca, Mixtec, *Reko*).

The plant was reported from Mexico by Mociño and Sessé as *G. afrum* L. The wood is hard and resinous, strong and durable, and is good for firewood, being used sometimes for fuel in railroad engines. It is employed also for making articles in which great strength is required. The tree is believed to have essentially the same properties as *G. sanctum.*

The writer has not seen type material of *G. planchoni,* which was described from Oaxaca, but other material from that state differs in no way from *G. coulteri,* and the characters supposed to separate the two species seem not to hold in the material examined.

5. SERICODES A. Gray, Pl. Wright. 1: 28. 1852.

1. Sericodes greggii A. Gray, Pl. Wright. **1**: 28. 1852.

Durango, Zacatecas, Coahuila, and Nuevo León; type from San Lorenzo (Coahuila?).

Low, densely branched shrub; leaves fascicled, linear or oblanceolate, 8 to 12 mm. long, strigose; flowers small, yellowish; fruit a small capsule, separating into 5 carpels, densely covered with long white hairs.

6. MORKILLIA Rose & Painter, Smiths. Misc. Coll. 50[1]: 33. 1907.

Erect shrubs; leaves alternate, odd-pinnate, with large entire leaflets; flowers very large, deep rose-purple, solitary or geminate; fruit a large 4-winged capsule.

Leaflets acute or obtuse; wings of the fruit produced at the apex, the sinus narrow ..... **1. M. mexicana.**

Leaflets acuminate; wings of the fruit scarcely produced, the sinus broad and open ..... **2. M. acuminata.**

1. Morkillia mexicana (Moc. & Sessé) Rose & Painter, Smiths. Misc. Coll. **50[1]**: 33. 1907.

Chitonia mexicana Moc. & Sessé; DC. Prodr. **1**: 707. 1824.

Hidalgo, Puebla, and Oaxaca.

Shrub, 3 to 5 meters high, with grayish white bark; leaflets 7 to 15, 3 to 5 cm. long, densely pubescent; petals 3 to 4 cm. long; fruit 4 to 6 cm. long. "Guayacán" (Oaxaca).

2. Morkillia acuminata Rose & Painter, Smiths. Misc. Coll. **50[1]**: 34. 1907.

Known only from the type locality, mountains between Victoria and Jaumave Valley, Tamaulipas.

Shrub, 3 to 5 meters high, densely pubescent; leaflets 3 to 9, 1 to 3 cm. long; petals 2.5 to 3 cm. long; fruit 5 cm. long.

7. VISCAINOA Greene, Pittonia 1: 163. 1888.

1. **Viscainoa geniculata** (Kellogg) Greene, Pittonia 1: 163. 1888.

Staphylea geniculata Kellogg, Proc. Calif. Acad. 2: 22. 1859.

Baja California and western Sonora; type from San Sebastián Bay, Baja California.

Shrub, 1.5 to 3.5 meters high, cinereous-pubescent, with crooked branches; leaves alternate, simple or pinnate, with 3 or 5 leaflets, these mostly oval, 2 to 5 cm. long; flowers large, yellowish white; fruit a capsule, 2 to 3 cm. long, usually 4-lobed. "Guayacán" (Baja California).

68. RUTACEAE. Rue Family.

Reference: P. Wilson, N. Amer. Fl. 25: 173–224. 1911.

Aromatic trees or shrubs, often armed with spines, usually furnished with glands in bark, leaves, and fruit; leaves opposite or alternate, estipulate, simple or compound; flowers perfect or unisexual, large or small; calyx inferior, with 3 to 5 lobes or sepals; petals 3 to 5, usually imbricate, sometimes united; stamens as many or twice as many as the petals; ovary of 1 to 5 or more free or united carpels; styles free or connate; fruit a follicle, capsule, samara, drupe, or berry.

No herbaceous plants of the family are natives of Mexico. The rue family includes the important tropical citrus fruits, of which the following, and perhaps some others, are cultivated in Mexico. *Citrus medica* L., the citron ("cidra," "cedro limón," "cidrero"), with large fruits containing scant pulp, the rind of which is candied and used in confectionery; *C. limonia* Osbeck, the lemon ("limón," limón agrio," "limonero"; "nimû," Otomí; "tzapposh," Mixe); *C. aurantifolia* (Christm.) Swingle,[1] the lime ("lima," "lima chica," "limón dulce," "lima chicona"); *C. aurantium* L., the sour orange ("naranja agria"); *C. sinesis* Osbeck, the common or sweet orange ("naranja," "naranja dulce"; "yaga-naraxo," Zapotec; "tzaptzouk," "tzapkiuk," "tzaptzuik," Mixe; "nanxa," "xidni," Otomí); *C. grandis* Osbeck, the grapefruit, pomelo, or shaddock ("toronja"); *Triphasia trifolia* (Burm.) P. Wilson, the lime-berry ("limoncito"), a small tree, grown for ornament. Some of these trees have escaped from cultivation in the warmer parts of Mexico.

The citrus fruits were introduced into Mexico by the Spaniards immediately after the Conquest. Bernal Díaz del Castillo[2] claims for himself the honor of introducing the orange into Mexico, in 1518, while he was with Grijalva's expedition. His account is as follows: "As this country [in Tabasco, at the mouth of the Tonalá River] is infested by mosquitos, in order to avoid them I went to sleep in a large temple, near which I at this time sowed seven or eight seeds of oranges, which I had brought from Cuba. They grew very well, for the priests of the temple took care of them when they saw that they were uncommon plants. This I mention, because they were the first trees of the kind that ever grew in New Spain. After the conquest of Mexico, this province being considered as offering the greatest advantages, was chosen by most of the principal persons amongst the conquerors, of which number I was one; and on my arrival there I went in search of, and found my young trees flourishing, and having transplanted them, they all did very well."

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[1] Often known incorrectly as *Citrus limetta*.

[2] True history of the Conquest of Mexico, translation by Keating, p. 23. 1800.

Fruit a drupe.
  Leaves digitately 3 to 7-foliolate.
    Style lateral_____1. **SARGENTIA.**
    Style terminal_____2. **CASIMIROA.**
  Leaves simple, 1-foliolate, or pinnate.
    Style lateral; leaves linear or nearly so, simple_____3. **CNEORIDIUM.**
    Style terminal; leaves compound, or, if simple, much broader than linear.
      Stamens as many as the petals_____4. **STAURANTHUS.**
      Stamens twice as many as the petals_____5. **AMYRIS.**
Fruit a capsule or samara, or of follicles.
  Corolla gamopetalous; filaments more or less united with the corolla tube.
    Leaves 1-foliolate_____6. **ERYTHROCHITON.**
  Corolla polypetalous; filaments free from the petals.
    Ovules 5 or more in each carpel. Leaves simple_____7. **THAMNOSMA.**
    Ovules 2 or 1 in each carpel.
      Fruit a samara or samara-like. Leaves digitate, the leaflets 3.
        Carpels of the fruit separating at maturity; flowers usually perfect.
          8. HELIETTA.
        Carpels not separating; flowers polygamous.
          Samara woody, wingless or nearly so_____9. **TARAVALIA.**
          Samara not woody, surrounded by a broad wing_____10. **PTELEA.**
      Fruit a capsule or of 1 or more follicles.
        Stamens as many as the petals.
          Flowers unisexual; plants usually armed with spines. Leaves pinnate_____11. **ZANTHOXYLUM.**
          Flowers perfect; plants unarmed.
            Leaves pinnate; fruit of 1 or 3 follicles_____12. **PILOCARPUS.**
            Leaves simple, 1-foliolate, or digitate; fruit a woody capsule.
              13. ESENBECKIA.
        Stamens twice as many as the petals or more.
          Calyx deciduous; leaves digitate.
            Leaves alternate; sepals very unequal_____14. **PELTOSIGMA.**
            Leaves opposite; sepals subequal_____15. **CHOISYA.**
          Calyx persistent; leaves pinnate.
            Ovary 2-celled. Leaflets 5 or 7, 3 to 7 mm. long.
              16. MEGASTIGMA.
            Ovary 5-celled.
              Calyx of 5 distinct or nearly distinct sepals; leaflets 11 to 25. 6 to 12 mm. long._____17. **POLYASTER.**
              Calyx 5-dentate; leaflets 5 to 11, 2.5 to 10 cm. long.
                18. DECATROPIS.

1. SARGENTIA S. Wats. Proc. Amer. Acad. **25**: 144. 1890.

1. Sargentia greggii S. Wats. Proc. Amer. Acad. **25**: 144. 1890.

Nuevo León, Tamaulipas, and San Luis Potosí; type from Monterrey, Nuevo León.

Tree, sometimes 13 meters high; bark smooth, gray, peeling off in thin plates; leaves alternate, persistent, digitately 2 or 3-foliolate, 3 to 10 cm. long, obtuse or acutish, nearly glabrous, entire; flowers small, white; fruit fleshy, edible, 1.5 to 2 cm. long, yellow; seeds brown, 1.2 to 1.4 cm. long. "Limoncillo" (Tamaulipas, San Luis Potosí); "chapote amarillo" (Nuevo León); "naranjillo" (Tamaulipas).

The wood is said to be used for fuel, carts, and other purposes.

2. CASIMIROA[1] Llave & Lex. Nov. Veg. Descr. 2: 2. 1825.

Unarmed trees or shrubs; leaves persistent, alternate, digitate, the leaflets coriaceous, usually entire; flowers small, perfect; fruit a drupe, 2 to 5-celled, with a single seed in each cell.

Leaflets densely velvety-pubescent beneath.
  Leaflets 3, obtuse; petioles 1.5 to 3 cm. long ---------- 1. C. pubescens.
  Leaflets usually 5, acuminate; petioles 3 to 12 cm. long ---------- 2. C. tetrameria.
Leaflets glabrous beneath or nearly so, sometimes pilose along the costa.
  Fruit 1.2 to 1.8 cm. in diameter ---------- 3. C. pringlei.
  Fruit 5 to 10 cm. in diameter.
    Leaflets obtuse ---------- 4. C. watsonii.
    Leaflets acuminate.
      Leaflets 5 or rarely 7, the lateral ones sessile or on short stout petiolules. 5. C. edulis.
      Leaflets usually 3, the lateral ones on slender petiolules 1 to 3 cm. long. 6. C. sapota.

1. **Casimiroa pubescens** Ramírez, Anal. Inst. Med. Nac. Mex. 2: 19. *pl. 5.* 1896.

Querétaro and San Luis Potosí; type from El Madroño, Sierra Gorda, Querétaro, altitude 2,400 meters.

Shrub, about 2 meters high, much branched, densely pubescent; leaflets 3 or sometimes 1, oblong-obovate to elliptic, 4 to 6.5 cm. long; fruit depressed-globose, about 4 cm. broad, pubescent, the pulp white and scanty; seeds 5 or 6. "Zapote de rata" (Querétaro).

2. **Casimiroa tetrameria** Millsp. Field Mus. Bot. 1: 401. 1898.

Yucatán and Michoacán; type from Xcholac, Yucatán. Guatemala to Costa Rica.

Tree, 6 to 15 meters high, with rounded crown; leaflets oblong-ovate to elliptic, usually 7 to 16 cm. long, entire or obscurely crenate. "Matasano" (Costa Rica, Honduras).

The fruit of this species is not known to the writer, but it is probably similar to that of *C. edulis*. This species has been confused with *C. sapota*, but it is more closely related to *C. edulis*, of which it may be only a pubescent form.

3. **Casimiroa pringlei** (S. Wats.) Engl. in Engl. & Prantl, Pflanzenfam. 3[4]: 178, 1896.

Sargentia pringlei S. Wats. Proc. Amer. Acad. 26: 134. 1891.

Nuevo León, San Luis Potosí, and Durango; type from San José Pass, San Luis Potosí.

Shrub or small tree, 3 to 5 meters high, with grayish bark; leaflets 2 or 3, obovate or elliptic, 3 to 9 cm. long, obtuse or acutish, glabrous or nearly so, entire; flowers greenish yellow; fruit subglobose or oval, 1.2 to 1.8 cm. broad; seeds 10 to 12 mm. long.

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[1] The genus was dedicated to Casimiro Gómez, of whom the authors write as follows: "Casimiro Gómez, ad Cardonal ex tribu Ottomitarum edito, viro sobrio ac temperanti, in gerendo bello, promto, sagaci animosissimo, ipsi, quod a luxu abhorrens, et se milites suos humili victu ac vestitu conservans ac ducens, exigua Ottomitarum manu, innumerabilia ac gloriosissima pro patriae bono gesserit."

4. **Casimiroa watsonii** Engler; P. Wilson, N. Amer. Fl. **25**: 214. 1911.

Known only from the type locality, near Guadalajara, Jalisco.

Leaflets 3 or 4, elliptic to oblanceolate, 3 to 7.5 cm. long, entire or nearly so, glabrate; fruit sweet and edible, containing 1 or 2 seeds.

It seems rather doubtful whether this is distinct from *C. pringlei.*

5. **Casimiroa edulis** Llave & Lex. Nov. Veg. Descr. **2**: 2. 1825.

Sonora to Jalisco; often cultivated; reported from many other parts of Mexico, but probably because of confusion with *C. sapota.* Guatemala.

Large or medium-sized tree, with broad dense crown; leaflets almost always 5, elliptic, oval, or broadly ovate, bright green, nearly or quite glabrous, often lustrous; flowers white; fruit 8 to 10 cm. broad, yellowish, with sweet pulp; seeds usually 5, 1.8 to 2.3 cm. long. The following names are reported, but most of them probably belong equally or exclusively to *C. sapota:* "Zapote blanco" (the most common name); "zapote;" "chapote;" "matasano (Oaxaca); "cochiztzapotl" (Nahuatl, "sleepy-zapote"); "iztactzapotl" (Nahuatl; "white-zapote"); "ccaxmuttza" (Otomí, *Buelna*).

This species may have a wider range than is indicated, but all the Mexican specimens seen by the writer come from the Pacific coast. It is not absolutely certain that this species, rather than *C. sapota*, is the one described by Llave and Lexarza, but their description seems to agree better with it.

The white sapote (including also *Casimiroa sapota*) is a well-known tree in Mexico, but is little grown outside that country. It is cultivated in the West Indies and has been introduced into southern California. The fruit varies in size and quality. It somewhat resembles an apple, and the best varieties are as large as a good-sized orange. The tender yellowish skin is thin, like that of an apple; the pulp is soft and cream-colored, of delicate texture, with a pleasant sweet flavor. The fruit ripens in July and August. It is much eaten in Mexico and is commonly sold in the markets.

The fruits are popularly believed to induce sleep if eaten in quantity, and to calm rheumatic pains. The bark, leaves, and especially the seeds are said to contain a glucoside, casimirosine, which has a hypnotic and sedative effect upon cerebral centers. A small dose, it is stated, produces, at the end of an hour, deep sleep which lasts four to six hours. This principle, obtained chiefly from the seeds, has been used by Mexican physicians.

The white sapote is described by Hernández,[1] who says:

"The *Cochitzapotl* is a large irregular tree, with thin foliage of ternate leaves like those of the orange; the trunk is spattered with white spots; the flowers are yellow and medium-sized; the fruit, of the shape and size of a quince, is called by the Spaniards *Zapote blanco;* it is edible and of agreeable flavor, but it is not to be counted a wholesome food; the stone which it contains is a deadly poison. The bark of the tree is dry and somewhat sweet, with a certain bitterness; the leaves, crushed and applied to the nipples of the nurse, cure diarrhea in infants; the seeds, crushed and roasted, cure putrid ulcers and proud flesh, and by exciting suppuration produce new flesh and hasten healing; if eaten, the fruits induce drowsiness, whence the name. The tree grows in hot and cold regions."

6. **Casimiroa sapota** Oerst. Nat. For. Kjöbenhavn Vid. Medd. **1857**: 157. 1858.

San Luis Potosí and Querétaro to Jalisco and Oaxaca. Type from Nicaragua.

Tree, similar to the preceding species; leaflets nearly always 3, smaller and narrower, on very long petiolules. "Zapote" (Querétaro); "zapote blanco" (Jalisco); "matasano" (Nicaragua).

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[1] Thesaurus 89. 1651.

This species has been considered the same as *C. edulis*, but to the writer it seems amply distinct, the leaves of the two being very different. All the species of the genus are represented by inadequate herbarium material.

3. CNEORIDIUM Hook. f.; Benth. & Hook. Gen. Pl. 1: 312. 1862.

1. **Cneoridium dumosum** (Nutt.) Hook. f.; Baill. Hist. Pl. 4: 498. 1873.
Pitavia dumosa Nutt.; Torr. & Gray, Fl. N. Amer. 1: 215. 1838.
Baja California. Southern California; type from San Diego.
Densely branched shrub, 0.5 to 1.5 meters high; leaves opposite or fasciculate, linear or oblong-linear, 1.5 to 2.5 cm. long, green, entire or nearly so; flowers very small; fruit a capsule, 5 to 6 mm. broad.

4. STAURANTHUS Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 91. 1853.

Unarmed trees; leaves alternate, simple or unifoliolate, gland-dotted; flowers small, in terminal or axillary racemes or panicles; fruit a 1-seeded drupe.

Leaves 3.5 to 7 cm. wide, abruptly short-acuminate at apex; flowers racemose. **1. S. perforatus.**

Leaves 1.5 to 2.5 cm. wide, gradually attenuate to apex; flowers mostly paniculate ---------- 2. S. conzattii.

1. **Stauranthus perforatus** Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 92. 1854.
Zanthoxylum ghiesbreghtii Turcz. Bull. Soc. Nat. Moscou 32 [1]: 274. 1859.
Veracruz; type collected between Totutla and Huatusco.
Glabrous tree; leaves unifoliolate, the petioles 0.8 to 2.2 cm. long, the leaflets oblong-elliptic, 10 to 18 cm. long.

2. **Stauranthus conzattii** Rose & Standl., sp. nov.
Type from Cerro San Antonio, Oaxaca, altitude 1,700 meters (*Conzatti* 2445; U. S. Nat. Herb. no. 841056).
Glabrous tree or shrub, with reddish brown branches; leaves simple, the petioles stout, 5 to 8 mm. long, subterete, the blades lanceolate or oblong-lanceolate, 6 to 9.5 cm. long, 1.3 to 2.5 cm. wide, rounded or obtuse at the base, gradually attenuate from the middle or lower to the acute or subobtuse apex, coriaceous, bright green, sublustrous above, the venation plane or prominulous, scarcely paler beneath, the costa slender but prominent, the other venation prominulous, conspicuously gland-dotted; flowers few, in small terminal or axillary racemes or panicles, the pedicels stout, 2 mm. long or shorter; calyx 1.8 mm. broad, the lobes very obtuse; ovary smooth; fruit globose, about 8 mm. in diameter; seed globose, 7 mm. in diameter.
Only one other species of the genus is known, *S. perforatus* Liebm. It differs from the present plant in having unifoliolate leaves, the leaflet being much larger and broader than the leaf of *S. conzattii*, and abruptly short-acuminate at the apex. The Veracruz plant, moreover, has longer petioles and axillary racemes. The flowers of *S. conzattii* are not known, and until they have been studied, the generic position of the plant must remain in doubt. It may be that it should be referred rather to *Amyris*.

5. AMYRIS L. Syst. Nat. ed. 10. 996. 1759.

Unarmed trees or shrubs; leaves opposite or alternate, pinnate, sometimes unifoliolate, the leaflets entire or crenulate; flowers small, perfect, paniculate, white or yellowish white; fruit a drupe.

Leaflet 1.
Petioles 2 to 5 mm. long ---------- **1. A. monophylla.**
Petioles 15 to 24 mm. long ---------- **2. A. rekoi.**

Leaflets 3 or more.
  Leaves opposite.
    Leaflets usually 7 to 11, sometimes 5, densely puberulent beneath.
      3. A. madrensis.
    Leaflets 3 or 5, glabrous beneath or nearly so.
      Lateral leaflets subcordate at base, rounded at apex, pale beneath.
        4. A. purpusi.
      Lateral leaflets obtuse at base, acuminate at apex, green beneath.
        5. A. balsamifera.
  Leaves alternate.
    Leaflets 1 to 3 cm. long, 0.5 to 1.5 cm. wide, the terminal one short-stalked.
      6. A. texana.
    Leaflets 3 to 10 cm. long, 2 to 9 cm. wide, the terminal one long-stalked.
      Petioles not winged; leaflets acute, ovate or rhombic-ovate.
        7. A. sylvatica.
      Petioles usually winged; leaflets acuminate, elliptic to rhombic-lanceolate.
        8. A. thyrsiflora.

1. **Amyris monophylla** T. S. Brandeg. Univ. Calif. Publ. Bot. **3**: 381. 1909.

Oaxaca and Puebla; type from San Luis Tultitlanapa, Puebla.

Glabrous shrub; leaflet ovate to oval, 2.5 to 5 cm. long, rounded or obtuse at apex, coriaceous, entire or nearly so.

2. **Amyris rekoi** Blake, Contr. Gray Herb. n. ser. **53**: 56. 1918.

Tepic and Oaxaca; type from Cafetal Nueva Esperanza, Department of Pochutla, Oaxaca, altitude 700 meters.

Glabrous tree or shrub; leaflet lance-ovate to oblong-ovate, 6.5 to 11.5 cm. long, acuminate; fruit bluish black, 5 mm. in diameter.

3. **Amyris madrensis** S. Wats. Proc. Amer. Acad. **25**: 144. 1890.

Nuevo León and San Luis Potosí; type from mountains near Monterrey, Nuevo León. Southwestern Texas.

Very leafy shrub; leaflets rhombic, 1.5 to 3 cm. long, coriaceous, entire or crenate; fruit 10 to 12 mm. long.

4. **Amyris purpusi** P. Wilson, Bull. Torrey Club **37**: 86. 1910.

Known only from the type locality, Zacuapan, Veracruz.

Small tree; leaflets 3, oval or ovate, 2 to 4 cm. long, entire or nearly so.

5. **Amyris balsamifera** L. Syst. Nat. ed. 10. 1000. 1759.

Sinaloa to Guerrero. West Indies, South America, and southern Florida; type from Jamaica.

Shrub or tree, sometimes 7 meters high, with a trunk 20 cm. in diameter; leaflets 3 or 5, 5 to 13 cm. long, entire or crenulate; flowers white; fruit obovoid or elliptic, 6 to 13 mm. long, bluish black, aromatic; wood hard, close-grained, orange, very resinous, its specific gravity about 1.04. "Limoncillo" (Sinaloa).

The Mexican material may represent a distinct species, but the material at hand is too incomplete to determine this point.

6. **Amyris texana** (Buckl.) P. Wilson, Torreya **8**: 139. 1908.

Zanthoxylum texanum Buckl. Bull. Torrey Club **10**: 90. 1883.

Amyris parvifolia A. Gray, Proc. Amer. Acad. **23**: 226. 1888.

Nuevo León. Western Texas; type from Corpus Christi.

Glabrous aromatic shrub, 1 to 2 meters high, leaflets 3, ovate, obtuse. "Chapotillo" (Nuevo León).

7. **Amyris sylvatica** Jacq. Stirp. Amer. 107. 1763.

Veracruz and perhaps elsewhere. Central America, West Indies, and northern South America; type from Cartagena, Colombia.

Glabrous shrub or tree, 2 to 9 meters high; leaflets crenate, bright green; fruit 4.5 to 7 mm. long, black or reddish. "Tea" (Porto Rico).

8. **Amyris thyrsiflora** Turcz. Bull. Soc. Nat. Moscou 31 [1]: 475. 1858.

Veracruz.

Glabrous shrub or tree; leaflets crenate or entire, coriaceous, lustrous; flowers white, fragrant.

6. **ERYTHROCHITON** Nees & Mart. Nov. Act. Acad. Caes. Leop. Carol. **11**: 151. 1823.

1. **Erythrochiton lindeni** (Baill.) Hemsl. Biol. Centr. Amer. Bot. **1**: 166. 1879.

Toxosiphon lindeni Baill. Adansonia **10**: 312. 1872.

Tabasco; type from Teapa. Central America.

Shrub, about 2 meters high; leaves long-petiolate, the leaflet 1, oval or elliptic, 10 to 35 cm. long, entire, glabrous; flowers white, in scorpioid cymes, the sepals 2 to 4 cm. long.

7. **THAMNOSMA** Torr. & Frém. in Frém. Rep. Exped. Rocky Mount. 313. 1845.

Erect shrubs or sometimes herbs; leaves alternate, linear or reduced to scales, entire; flowers small, racemose; fruit a 2-lobed capsule.

Petals 3 to 5 mm. long; leaves present; seeds 1.5 to 2 mm. long__1. **T. texana.**
Petals 8 to 14 mm. long; leaves usually absent; seeds 4 to 6 mm. long
2. **T. montana.**

1. **Thamnosma texana** (A. Gray) Torr. U. S. & Mex. Bound. Bot. 42. 1859.

Rutosma texana A. Gray, Gen. Fl. Amer. **2**: 144. 1849.

Chihuahua to Nuevo León and San Luis Potosí. Western Texas (type locality) to Colorado and Arizona.

Slender shrub, 50 cm. high or less, or often herbaceous; leaves linear, 5 to 15 mm. long; flowers yellowish or purplish.

2. **Thamnosma montana** Torr. & Frém. Rep. Exped. Rocky Mount. 313. 1845.

Northern Baja California and probably northern Sonora. California to Arizona and Utah; type from Nevada.

Glandular shrub, 30 to 60 cm. high, the branches often spinose, yellowish green; leaves 5 to 10 mm. long but early deciduous; flowers purple. "Cordoncillo" (Arizona).

A decoction of the plant is used by the Pima and Apache Indians as a remedy for gonorrhoea, and in Arizona it is employed as a general tonic and blood purifier.

8. **HELIETTA** Tulasne, Ann. Sci. Nat. III. **7**: 280. 1847.

1. **Helietta parvifolia** (A. Gray) Benth. in Hook. Icon. Pl. **14**: 66. 1882.

Ptelea parvifolia A. Gray; Hemsl. Biol. Centr. Amer. Bot. **1**: 170. 1879.

Coahuila to Tamaulipas and Querétaro; type from Carrizal, Nuevo León. Western Texas.

Shrub or tree, sometimes 8 meters high, with a slender trunk 15 cm. in diameter; bark thin, dark brown, scaly; leaves opposite, persistent, digitate, the leaflets 3, obovate, 1 to 5 cm. long, obtuse, usually entire, glabrous, flowers small, white, cymose; fruit 6 to 8 mm. long, with thin wings; wood hard, close-grained, orange-brown, the specific gravity about 0.88. "Barreta" (Nuevo León, Tamaulipas, Coahuila, Texas).

9. TARAVALIA Greene, Leaflets 1: 222. 1906.

1. Taravalia aptera (Parry) Greene, Leaflets 1: 222. 1906.
Ptelea aptera Parry, Proc. Davenport Acad. 4: 39. 1884.
Ptelea nucifera Greene, Contr. U. S. Nat. Herb. 10: 75. 1906.
Ptelea obscura Greene, Contr. U. S. Nat. Herb. 10: 76. 1906.
Baja California; type from Bahia de Todos Santos.

Shrub or small tree, sometimes 5 meters high; leaves alternate, digitate, the leaflets 3, gland-dotted, 1 to 3 cm. long, obtuse or acute; flowers few, small, white; fruit nutlike, indehiscent.

10. PTELEA L. Sp. Pl. 118. 1753.

1. Ptelea trifoliata L. Sp. Pl. 118. 1753.
Ptelea pentandra Moc. & Sessé; DC. Prodr. 2: 83. 1825.
Ptelea angustifolia Benth. Pl. Hartw. 9. 1839.
Ptelea subintegra Greene, Contr. U. S. Nat. Herb. 10: 61. 1906.
Ptelea coahuilensis Greene, Contr. U. S. Nat. Herb. 10: 61. 1906.
Ptelea obtusata Greene, Contr. U. S. Nat. Herb. 10: 61. 1906.
Ptelea pumila Greene, Contr. U. S. Nat. Herb. 10: 61. 1906.
Ptelea scutellata Greene, Contr. U. S. Nat. Herb. 10: 62. 1906.
Ptelea cuspidata Greene, Contr. U. S. Nat. Herb. 10: 62. 1906.
Ptelea sancta Greene, Contr. U. S. Nat. Herb. 10: 63. 1906.
Ptelea glauca Greene, Contr. U. S. Nat. Herb. 10: 64. 1906.
Ptelea acutifolia Greene & Rose, Contr. U. S. Nat. Herb. 10: 68. 1906.
Ptelea megacarpa Rose; Greene, Contr. U. S. Nat. Herb. 10: 68. 1906.
Ptelea laetissima Greene & Rose, Contr. U. S. Nat. Herb. 10: 69. 1906.
Sonora to Tamaulipas and Oaxaca. Widely distributed in the United States.

Shrub or small tree, sometimes 7 meters high, with a trunk 20 cm. in diameter, the whole plant with a disagreeable odor; bark thin, smooth or nearly so, dark gray, reddish brown on young branches; leaves alternate, digitately 3-foliolate, the leaflets very variable in shape and size, glabrous or pubescent; flowers greenish white, cymose; fruit a samara, 1 to 2.5 cm. long; wood hard, close-grained, yellowish brown, its specific gravity about 0.83. "Cola de zorrillo" (Chihuahua).

In the United States, where the plant is known as "hop-tree" and "wafer-ash," the fruit has been employed as a substitute for hops. The root has a bitter, pungent, and slightly acrid but not disagreeable taste and a somewhat aromatic odor. It contains the alkaloid berberine. It has been employed as a remedy for dyspepsia and as a mild tonic.

Many segregates from this species have been published besides the Mexican ones cited above. The species exhibits a large amount of variation, but it seems impossible to divide the specimens into groups by any constant character. Wilson, in the North American Flora, has recognized three species, but the key characters given for the species are obviously of little value. Of the Mexican segregates, *P. pumila* is the most distinct, because of its very small leaflets.

11. ZANTHOXYLUM L. Sp. Pl. 270. 1753.

Shrubs or trees, often armed with spines; leaves alternate, even-pinnate, odd-pinnate, or rarely unifoliolate, deciduous or persistent, the leaflets entire or crenulate; flowers small, whitish or yellowish; fruit of 1 to 5 follicles.

The dried bark of two United States species, *Z. americanum* Mill. and *Z. clava-herculis* L., which are known as "prickly ash," is official in the U. S. Pharmacopoeia. It contains one or more alkaloids and is used as a stimulant

and, externally, as a counter irritant, especially in the treatment of chronic rheumatism. One of the Australian species is reported to be a violent convulsive poison, and is said to be used by the natives for poisoning fish.

Leaves even-pinnate.
- Sepals and petals each 4 or 5 ---------- **19. Z. microcarpum.**
- Sepals and petals each 3.
  - Follicles 4 to 4.8 mm. long, blackish; marginal glands of the leaflets obsolete. **1. Z. pringlei.**
  - Follicles 5 to 7 mm. long, brown; marginal glands of the young leaflets conspicuous ---------- **2. Z. procerum.**

Leaves odd-pinnate.
- Leaflets rounded or very obtuse at apex, small, 1.5 cm. wide or narrower.
  - Leaflets 3 ---------- **3. Z. liebmannianum.**
  - Leaflets 5 or more.
    - Leaflets 25 to 61 ---------- **4. Z. elegantissimum.**
    - Leaflets 5 to 17.
      - Flowers in short, often lateral spikes or spikelike racemes.
        - Follicles 3.5 to 4 mm. broad, the stipe usually long and slender. **5. Z. fagara.**
        - Follicles 4 to 5.5 mm. broad, the stipe short and stout -- **6. Z. affine.**
      - Flowers usually in terminal or lateral panicles or in long slender racemes.
        - Calyx of oblong or ovate, distinct sepals ---------- **7. Z. purpusii.**
        - Calyx of triangular or suborbicular lobes, persistent.
          - Leaflets 7 to 15; follicles 5 to 7 mm. long -------- **8. Z. insulare.**
          - Leaflets 5 or 7; follicles 3.5 to 4 mm. long ------- **9. Z. culantrillo.**
- Leaflets acute or acuminate, or, if obtuse, 2.5 cm. wide or larger.
  - Sepals 4; leaflets 3 or rarely 5 ---------- **10. Z. limoncello.**
  - Sepals 5; leaflets 5 or more in most of the leaves.
    - Branches of the inflorescence corky-thickened; plants glabrous or nearly so.
      - Seeds 4 to 5 mm. long; follicles 4.5 to 8 mm. long; leaflets abruptly short-pointed ---------- **11. Z. caribaeum.**
      - Seeds 6 to 8 mm. long; follicles 9 to 15 mm. long; leaflets usually tapering to an acuminate tip.
        - Follicles sessile ---------- **12. Z. nelsoni.**
        - Follicles with a slender stipelike base ---------- **13. Z. elephantiasis.**
    - Branches of the inflorescence not corky-thickened; plants glabrous or pubescent.
      - Sepals suborbicular, strongly imbricate in flower ---- **14. Z. bijugum.**
      - Sepals oblong or ovate, not strongly imbricate in flower.
        - Leaflets glabrous ---------- **15. Z. melanostictum.**
        - Leaflets more or less pubescent beneath.
          - Calyx of distinct sepals, deciduous ---------- **16. Z. mollissimum.**
          - Calyx of united sepals, persistent.
            - Follicles 6 to 8 mm. long; pedicels stout; leaflets 9 to 14 cm. long ---------- **17. Z. goldmani.**
            - Follicles 4.5 to 5.5 long; pedicels slender; leaflets 5 to 7.5 cm. long ---------- **18. Z. arborescens.**

1. Zanthoxylum pringlei S. Wats. Proc. Amer. Acad. **26**: 134. 1891.

Known only from the type locality, Tamasopo Canyon, San Luis Potosí.

Tree, sometimes 13 meters high, the trunk 30 cm. in diameter, grayish, armed with short stout spines; leaflets 4 to 10, oblong, 3 to 7 cm. long, acute

or acuminate, glabrous, entire; flowers in large dense terminal panicles; fruit with an odor of camphor.

2. **Zanthoxylum procerum** Donn. Smith, Bot. Gaz. **23**: 4. 1897.

Oaxaca. Costa Rica; type from Santa María de Dota.

Nearly glabrous tree, 10 to 15 meters high, armed with spines, even on the leaf rachis; leaflets 4 to 12, oblong to elliptic, 6.5 to 17 cm. long, abruptly acuminate, lustrous, nearly entire; flowers white, in large terminal corymbs. "Palo de ropa" (Oaxaca); "lagartillo" (Costa Rica).

3. **Zanthoxylum liebmannianum** (Engl.) P. Wilson, Bull. Torrey Club **37**: 85. 1910.

Fagara liebmanniana Engl. Bot. Jahrb. Engler **21**: Beibl. **54**: 20. 1896.

Zanthoxylum longipes Rose, Contr. U. S. Nat. Herb. **5**: 163. 1899.

Puebla and Oaxaca; type from San Juan del Estado, Oaxaca.

Shrub or small tree, 3 to 4.5 meters high, unarmed or sparsely prickly; leaflets 1 to 3 cm. long, yellowish green, crenulate; seeds black, lustrous.

4. **Zanthoxylum elegantissimum** (Engl.) P. Wilson, Bull. Torrey Club **37**: 85. 1910.

Fagara elegantissima Engl. Bot. Jahrb. Engler **21**: Beibl. **54**: 25. 1896.

Veracruz; type from Chiconquiaco.

Glabrate shrub with slender flexuous branches, armed with small prickles; leaflets oval-oblong, 4 to 10 mm. long, entire or nearly so; flowers in large terminal panicles.

5. **Zanthoxylum fagara** (L.) Sarg. Gard. & For. **3**: 186. 1890.

Schinus fagara L. Sp. Pl. 389. 1753.

Fagara pterota L. Syst. Nat. ed. 10. 897. 1759.

Fagara lentiscifolia Humb. & Bonpl.; Willd. Enum. Pl. 165. 1809.

Zanthoxylum pterota H. B. K. Nov. Gen. & Sp. **6**: 3. 1823.

?*Zanthoxylum marginatum* Sessé & Moc. Fl. Mex. ed. 2. 231. 1894.

Baja California and Sonora to Tamaulipas, Veracruz, Yucatán, and Chiapas. Florida and Texas; Central America; West Indies; South America; type from Jamaica.

Shrub or tree, sometimes 10 meters high, with a strong odor; bark thin, gray, covered with thick corky projections, the branches armed with hooked prickles; leaf rachis broadly winged, the leaflets 5 to 13, 0.7 to 2.5 cm. long, crenulate; flowers yellowish green, dioecious; wood yellow, very hard, compact, reddish brown, the specific gravity about 0.74. "Colima" (Nuevo León, Tamaulipas, Chihuahua, Texas); "limoncillo" (Sinaloa, Cuba); "xic-ché" (Yucatán, Maya); "uña de gato" (Tamaulipas, Colombia); "palo mulato" (Jalisco, *Ramírez*); "tomeguín," "espino" (Cuba); "espino rubial" (Porto Rico); "correosa" (Texas); "uñagato" (Tamaulipas).

Known in the Bahamas as "wild lime." The young leaves are frequently tinged with bronze. A decoction of the leaves is used in domestic medicine; that of the bark is said to be sudorific and to act as an arterial and nervous stimulant. The leaves and bark have a pungent and acrid flavor, and have been used as a spice. The bark is said to give a yellow dye.

6. **Zanthoxylum affine** H. B. K. Nov. Gen. & Sp. **6**: 3. 1823.

Michoacán to Hidalgo and Puebla; type from Lake Cuitzeo, Michoacán.

Shrub or small tree, 3 to 4.5 meters high, armed with slender prickles; leaf rachis winged, the leaflets 7 to 17, 0.5 to 1.5 cm. long, entire or crenulate. "Palo mulato" (Michoacán, *Ramírez*).

7. **Zanthoxylum purpusii** T. S. Brandeg. Univ. Calif. Publ. Bot. **3**: 381. 1909.
Known only from the type locality, San Luis Tultitlanapa, Puebla.
Densely branched, spiny shrub, 1 to 2 meters high; leaflets 5 or 7, 5 to 15 mm. long, crenulate.

8. **Zanthoxylum insulare** Rose, U. S. Dept. Agr. N. Amer. Fauna **14**: 79. 1899.
Tres Marías and Socorro islands; type from María Madre Island. Jamaica; northern South America.
Glabrous shrub or tree, 4 to 18 meters high, the trunk grayish, armed with corky spines 1.5 to 3 cm. long; branches usually unarmed; leaflets 1.5 to 7 cm. long, coarsely crenate.

9. **Zanthoxylum culantrillo** H. B. K. Nov. Gen. & Sp. **6**: 2. 1823.
Morelos. Guatemala to Peru; type from Peru.
Shrub or small tree, pubescent; leaf rachis winged, the leaflets 0.7 to 3.5 cm. long, crenate or nearly entire; flowers yellowish green.

10. **Zanthoxylum limoncello** Planch. & Oerst.; Triana & Planch. Ann. Sci. Nat. V. **14**: 312. 1872.
Zanthoxylum foetidum Rose, Contr. U. S. Nat. Herb. **5**: 112. 1897.
Morelos. Central America; type from Volcán de Chiriquí, Panama.
Shrub or small tree, 2 to 6 meters high, armed with stout prickles; leaf rachis not winged, the leaflets 2 to 7.5 cm. long, nearly glabrous; flowers greenish, with unpleasant odor. "Limoncillo," "zorrillo" (Costa Rica).

11. **Zanthoxylum caribaeum** Lam. Encycl. **2**: 39. 1786.
Zanthoxylum occidentale Rose, Contr. U. S. Nat. Herb. **5**: 164. 1899.
Sinaloa and Tepic. West Indies and northern South America; type from Barbados.
Tree, 5 to 20 meters high, the trunk spiny; leaf rachis terete, the leaflets 7 to 13, 4.5 to 12 cm. long, glabrate, crenate. "Zorrillo" (Sinaloa); "espino rubial" (Porto Rico).
In the West Indies the bitter bark has been used for fevers and venereal diseases. The wood is said to be very durable.

12. **Zanthoxylum nelsoni** Rose, U. S. Dept. Agr. N. Amer. Fauna **14**: 79. 1899.
Known only from the type locality, María Madre Island, Tepic.
Glabrous tree, 7.5 to 20 meters high; leaf rachis terete, the leaflets 11 to 15, 4.5 to 10 cm. long, crenulate, conspicuously gland-dotted.

13. **Zanthoxylum elephantiasis** Macfad. Fl. Jam. **1**: 193. 1837.
Veracruz and perhaps elsewhere. Costa Rica and Panama; West Indies; type from Jamaica.
Tree, 5 to 18 meters high, the trunk sometimes 50 cm. in diameter; bark grayish, covered with large corky sharp-pointed cushions; branches prickly; leaf rachis terete, often prickly, the leaflets 5 to 17, 3.5 to 10.5 cm. long; flowers greenish yellow; sapwood thick, light brown, or nearly white, the heartwood darker, tinged with yellow, hard, light, fine-grained, taking a good polish, durable in the ground. "Ruda" (Panama); "pino macho" (Santo Domingo).

14. **Zanthoxylum bijugum** (Engl.) P. Wilson, Bull. Torrey Club **37**: 86. 1910.
Fagara bijuga Engl. Bot. Jahrb. Engler **21**: Beibl. **54**: 23. 1896.
Known only from the type locality, Tlacolula, Oaxaca.
Pubescent tree; leaflets 5, coriaceous, 2.5 to 6 cm. long.

15. **Zanthoxylum melanostictum** Schlecht. & Cham. Linnaea **5**: 231. 1830.
?*Fagara crassifolia* Engl. Bot. Jahrb. Engler **21**: Beibl. **54**: 21. 1896.
Veracruz and probably elsewhere.
Shrub or tree, unarmed or prickly; leaflets 3 to 7, coriaceous, 6 to 15 cm. long, entire or crenulate.

16. Zanthoxylum mollissimum (Engl.) P. Wilson, Bull. Torrey Club **37**: 86. 1910.

Fagara mollissima Engl. Bot. Jahrb. Engler **21**: Beibl. **54**: 22. 1896.

Known only from the type locality, Mina de Dolores.

Leaflets 9 to 11, 4 to 8.5 cm. long, entire or nearly so, densely pubescent.

17. Zanthoxylum goldmani Rose; P. Wilson, N. Amer. Fl. **25**: 195. 1911.

Known only from the type locality, between Culiacán and Las Flechas, Sinaloa.

Branches prickly; leaflets 7, coriaceous, crenate, pubescent beneath.

18. Zanthoxylum arborescens Rose, Contr. U. S. Nat. Herb. **5**: 112. 1897.

Zanthoxylum peninsulare T. S. Brandeg. Zoe **5**: 249. 1908.

Southern Baja California and Sinaloa; type from Imala, Sinaloa.

Small tree, 3 to 4 meters high, the branches unarmed or with few short prickles; leaflets 3 to 7, pubescent.

19. Zanthoxylum microcarpum Griseb. Fl. Brit. W. Ind. 138. 1859.

Fagara microcarpa Krug & Urb.; Urban, Bot. Jahrb. Engler **21**: 570. 1896.

Oaxaca. Costa Rica; Lesser Antilles; South America; type from Dominica.

Tree, sometimes 13 meters high, the bark covered with stout compressed prickles; leaflets 10 to 30, oblong or oblong-lanceolate, 3 to 9 cm. long, acute, serrate-crenate, pubescent or glabrate; panicles terminal, 10 to 15 cm. long; follicles 1 or 2, 4 to 5 mm. in diameter.

DOUBTFUL SPECIES.

FAGARA FALCIFOLIA Engl. Bot. Jahrb. Engler **21**: Beibl. **54**: 24. 1896. Type from Mirador, Veracruz. Based upon sterile specimens.

ZANTHOXYLUM PENTANOME DC. Prodr. **1**: 725. 1824. Described from Mexico. Referred doubtfully by Wilson to synonymy under *Z. monophyllum* (Lam.) P. Wilson. That, however, is not represented by herbarium specimens from Mexico. It is distinguished by 1-foliolate leaves. The name *Z. pentanome* has been much used in works relating to Mexican plants. Some species so named is reported to be a remedy for the "vómito negro" and for venereal diseases. It is said to be known as "palo mulato."

12. PILOCARPUS Vahl, Eclog. Amer. 1: 29. 1796.

The leaves of *P. jaborandi* Holmes and *P. microphyllus* Stapf, of Brazil, are official in the U. S. Pharmacopoeia, and leaves of other species also are used. They contain two alkaloids, pilocarpine and jaborine, which are the most reliable of diaphoretics. They are widely employed for the treatment of dropsy, pleurisy, rheumatism, Bright's disease, and similar affections.

1. Pilocarpus longipes Rose, Contr. U. S. Nat. Herb. **5**: 112. 1897.

Pilocarpus insularis Rose, U. S. Dept. Agr. N. Amer. Fauna **14**: 80. 1899.

Tepic to Guerrero; type from Acapulco, Guerrero.

Unarmed shrub or tree, 2 to 6 meters high; leaves alternate, pinnate, the leaflets usually 3 or 5, oblong to obovate, 3 to 10 cm. long, obtuse or retuse, entire, glabrous; flowers small, racemose; fruit of 1 or 3 carpels, these conspicuously ridged; seeds large, black.

Perhaps not essentially different from *P. racemosus* Vahl, of the West Indies.

13. ESENBECKIA H. B. K. Nov. Gen. & Sp. 7: 246. 1825.

Unarmed trees or shrubs; leaves alternate or rarely opposite, simple or 1 to 5-foliolate, the leaflets gland-dotted; flowers small, perfect, racemose or paniculate; fruit a hard woody capsule, very rough outside.

Leaves simple, the petioles not jointed.
  Fruit about 2 cm. broad; petioles 1 to 12 mm. long_____1. **E. hartmanii.**
  Fruit 3 to 4 cm. broad; petioles 10 to 35 mm. long_____2. **E. flava.**
Leaves compound, with 3 or 5 leaflets.
  Leaflets densely pubescent beneath_____3. **E. macrantha.**
  Leaflets glabrous beneath or nearly so.
    Inflorescence racemose, few-flowered; leaves short-petiolate, the glands large and conspicuous_____4. **E. collina.**
    Inflorescence paniculate; leaves long-petiolate, with small inconspicuous glands.
      Sepals puberulent outside; flowers 6 to 8 mm. broad__5. **E. pentaphylla.**
      Sepals glabrous outside; flowers 5 to 5.5 cm. broad___6. **E. berlandieri.**

1. **Esenbeckia hartmanii** Robins. & Fern. Proc. Amer. Acad. **30**: 115. 1894.

Sonora and Sinaloa; type from La Tinaja, Sonora.

Shrub, 2 to 3 meters high, with thick stiff branches; leaves oblong to oval, entire, 2 to 8 cm. long, rounded or retuse at apex, pubescent beneath.

2. **Esenbeckia flava** T. S. Brandeg. Zoe **1**: 378. 1891.

Southern Baja California; type from San José del Cabo.

Shrub or small tree, sometimes 9 meters high, with a trunk 20 cm. in diameter; leaves oblong or oval, 5 to 14 cm. long, pubescent beneath; flowers white, 1.4 cm. broad; fruit covered with spinelike projections; wood yellow. "Palo amarillo."

3. **Esenbeckia macrantha** Rose, Contr. U. S. Nat. Herb. **5**: 111. 1897.

Oaxaca and Puebla; type collected near Dominguillo, Oaxaca.

Tree, 4 to 6 meters high; leaflets 3, 15 to 20 cm. long, obtuse or short-acuminate; flowers white, 8 to 10 mm. broad; fruit 3 cm. broad.

4. **Esenbeckia collina** T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 183. 1915.

Known only from the type locality, Cerro del Picacho, Oaxaca.

Leaflets 3, 3 to 5 cm. long, rounded or retuse at apex.

5. **Zanthoxylum fagara** (L.) Sarg. Gard. & For. **3**: 186. 1890.

Galipea pentaphylla Macfad. Fl. Jam. **1**: 196. 1837.

Yucatán. Jamaica (type locality).

Tree, sometimes 15 meters high, with brownish or grayish bark; leaflets usually 5, 6 to 17 cm. long; flowers yellowish white. "Yax-hocob" (Yucatán, Maya).

The plant of Yucatán may not be distinct from *E. berlandieri.*

6. **Esenbeckia berlandieri** Baill. Adansonia **10**: 151. 1871.

Esenbeckia acapulcensis Rose, Contr. U. S. Nat. Herb. **5**: 111. 1897.

Esenbeckia ovata T. S. Brandeg. Univ. Calif. Publ. Bot. **7**: 327. 1920.

Guerrero, Tamaulipas, San Luis Potosí, and Veracruz; type from Tampico, Tamaulipas.

Tree, 4.5 to 6 meters high, with a trunk 7 to 12 cm. in diameter; leaflets 3 or 5, dark green, 4 to 17 cm. long, rounded at apex. "Jopoy" (Tamaulipas, *Palmer*).

14. PELTOSTIGMA Walp. Repert. Bot. 5: 386. 1846.

1. **Peltostigma pteleoides** (Hook.) Walp. Repert. Bot. **5**: 387. 1846.

Pachystigma pteleoides Hook. Icon. Pl. *pl. 698, 699.* 1844.

Hidalgo and probably elsewhere. Central America; Jamaica (type locality).

Tree, 5 to 8 meters high; leaves alternate, digitately 3 or 5-foliolate, the leaflets 5 to 20 cm. long, acute or acuminate, bright green, glabrate, entire or nearly so; flowers white, fragrant, 3 to 5.5 cm. broad; fruit of 6 to 10 large hard carpels.

15. CHOISYA H. B. K. Nov. Gen. & Sp. 6: 4. 1823.

REFERENCE: Standley, Proc. Biol. Soc. Washington **27**: 221–224. 1914.

Unarmed shrubs; leaves opposite or subopposite, persistent, digitately 3 to 13-foliolate; flowers perfect, white, in axillary cymes; fruit of 3 or 5 carpels.

Leaflets 3, oblong to ovate, 5 to 30 mm. wide_____1. C. ternata.
Leaflets 5 to 13, linear, 1 to 4 mm. wide.
Pubescence of the pedicels of minute appressed hairs. Leaflets 8 to 13. 2. C. dumosa.
Pubescence of the pedicels of slender spreading hairs.
Leaflets 3 to 5, 2 to 4 mm. wide, broadest at or above the middle, the margins plane or nearly so, repand-denticulate_____3. C. mollis.
Leaflets usually 7 to 11, rarely 5, 1.3 mm. wide or narrower, of uniform width throughout, the margins strongly revolute, entire or nearly so. 4. C. palmeri.

1. Choisya ternata H. B. K. Nov. Gen. & Sp. **6**: 6. 1823.

Juliania caryophillata Llave & Lex. Nov. Veg. Descr. **2**: 4. 1825.

Puebla and Oaxaca; reported from San Luis Potosí and the Valley of Mexico; often cultivated in gardens.

Aromatic shrub; leaflets 2 to 8 cm. long, rounded or emarginate at apex, entire, glabrate; petals white, 1 to 1.5 cm. long. "Hierba del clavo" (Oaxaca, San Luis Potosí, Valley of Mexico); "flor del clavo" (Valley of Mexico, *Ramírez*); "clavillo," "clavo de olor" (*Conzatti*).

The infusion of the plant is reputed to have antispasmodic properties.

2. Choisya dumosa (Torr.) A. Gray, Proc. Amer. Acad. **23**: 224. 1888.

Astrophyllum dumosum Torr. U. S. Rep. Expl. Miss. Pacif. **2**[2]: 161. 1854.

Chihuahua and Coahuila. Western Texas and southern New Mexico; type from New Mexico.

Shrub, 1 to 1.5 meters high, the branches and petioles roughened with large glands; leaflets 1 to 4 cm. long; petals about 8 mm. long. "Zorrillo" (New Mexico).

3. Choisya mollis Standl. Proc. Biol. Soc. Washington **27**: 223. 1914.

Known only from the type locality, which is not definitely known but is probably in northern Sonora.

Leaflets 1.2 to 4 cm. long, rounded at apex.

4. Choisya palmeri Standl. Proc. Biol. Soc. Washington **27**: 234. 1914.

Coahuila and Zacatecas; type from Chojo Grande, Coahuila.

Leaflets 0.6 to 1.7 cm. long; follicles 5 to 6 mm. long, glandular.

16. MEGASTIGMA Hook. f.; Benth & Hook. Gen. Pl. 1: 299. 1862.

1. Megastigma galeottii Baill. Adansonia **10**: 331. 1872.

Fagara pumila Engl. Bot. Jahrb. Engler **21**: Beibl. **54**: 21. 1896.

Puebla and Oaxaca; type from cactus plains of Oaxaca.

Small straggling shrub with crooked branches; leaves alternate, pinnate, the leaflets 5 or 7, ovate to orbicular, 3 to 7 mm. long, entire; flowers white, short-racemose, the petals 2 to 2.5 mm. long; fruit a follicle, 2.5 to 3 mm. in diameter.

17. POLYASTER Hook. f.; Benth. & Hook. Gen. Pl. 1: 299. 1862.

1. Polyaster boronioides Hook. f.; Benth. & Hook. Gen. Pl. **1**: 299. 1862.

?*Zanthoxylum inerme* Sessé & Moc. Fl. Mex. ed. 2. 230. 1894.

Polyaster ehrenbergii Engl. Bot. Jahrb. Engler **21**: Beibl. **54**: 26. 1896.

Tamaulipas to Hidalgo; type from Zimapán, Hidalgo.

Shrub, 2 meters high, unarmed; leaves alternate, pinnate, the rachis narrowly winged, the leaflets 11 to 25, oblong, 6 to 12 mm. long, minutely crenulate; flowers small, paniculate; fruit of 2 to 5 small carpels.

Sessé and Mociño give the vernacular name of *Zanthoxylum inerme* as "gobernadora."

18. DECATROPIS Hook. f.; Benth. & Hook. Gen. Pl. 1: 298. 1862.

1. Decatropis bicolor (Zucc.) Radlk. Sitzungsb. Math. Phys. Akad. Wiss. München **16**: 306. 1886.

Simaba bicolor Zucc. Flora **15**[2]: Beibl. 72. 1832.

Decatropis coulteri Hook. f.; Benth. & Hook. Gen. Pl. **1**: 299. 1862.

Nuevo León, Tamaulipas, Veracruz, and Hidalgo.

Shrub or small tree, 2 to 7 meters high, unarmed; leaves alternate, pinnate, the leaflets 5 to 11, lanceolate, 2.5 to 10 cm. long, thick, acute, green above, tomentose beneath; flowers small, white, in large terminal panicles; fruit of 2 to 5 small carpels.

69. KOEBERLINIACEAE. Junco Family.

Reference: Barnhart, N. Amer. Fl. **25**: 101–102. 1910.

1. KOEBERLINIA Zucc. Flora 15[2]: Beibl. 73. 1832.

1. Koeberlinia spinosa Zucc. Flora **15**[2]: Beibl. 73. 1832.

Northeastern Sonora to Tamaulipas and Hidalgo. Western Texas to southern Arizona.

Shrub or tree, sometimes 8 meters high, with a trunk 30 cm. in diameter, the branches short, stiff, green, spine-tipped; leaves alternate, minute, scale-like, soon deciduous; flowers small, greenish, short-racemose; fruit a small berry; wood hard, close-grained, dark brown or nearly black, its specific gravity about 1.12. Known generally in Mexico and Texas as "junco"; "abrojo" (*Ochoterena*); "corona de Cristo" (Arizona).

The wood is resinous and burns readily, giving off a disagreeable odor. The plant is little more than a great mass of spines, and often forms impenetrable thickets.

70. SURIANACEAE. Bay-cedar Family.

1. SURIANA L. Sp. Pl. 284. 1753.

1. Suriana maritima L. Sp. Pl. 284. 1853.

Yucatán. On coastal sands and rocks, Florida, West Indies, South America, and in the Old World; type from Bermuda.

Shrub or small tree, sometimes 8 meters high, with a trunk 30 cm. in diameter, but usually much smaller; bark rough, irregularly fissured, brown; leaves alternate, thick, linear-spatulate, 1.5 to 4 cm. long, entire, densely pubescent; flowers small, yellow, clustered; sepals 5, persistent; petals 5, imbricate, 7 to 9 mm. long, erose at apex; fruit of small carpels, 4.5 mm. long; wood very hard and heavy, reddish brown. "Cuabilla" (Cuba); "gitarón," "temporana" (Porto Rico).

Known in the Bahamas as "bay-cedar."

71. SIMAROUBACEAE. Simaruba Family.

Reference: Small, N. Amer. Fl. **25**: 227–239. 1911.

Shrubs or trees; leaves usually alternate, simple or pinnate; flowers perfect or unisexual, usually small; fruit a drupe, berry, capsule, or samara, the seeds usually solitary.

Besides the genera here listed, *Simaba cedron* Planch. has been reported from Mexico, but the writer has seen no specimens.

Leaves simple, sometimes reduced to scales.
  Leaves reduced to scales; petals 7 or 8 ---------- 1. **HOLACANTHA.**
  Leaves well developed; petals 4 ---------- 2. **CASTELA.**
Leaves pinnate.
  Fruit samara-like ---------- 3. **ALVARADOA.**
  Fruit drupaceous or baccate.
    Leaflets 3 ---------- 4. **PICRELLA.**
    Leaflets 5 or more in all or most of the leaves.
      Carpels of the fruit 1-ovulate.
        Stigmas distinct; leaflets usually 11 to 21 ---------- 5. **SIMAROUBA.**
        Stigmas united; leaflets usually 5 ---------- 6. **QUASSIA.**
      Carpels 2-ovulate.
        Carpels distinct ---------- 7. **RECCHIA.**
        Carpels united ---------- 8. **PICRAMNIA.**

1. **HOLACANTHA** A. Gray, Mem. Amer. Acad. II. 5: 310. 1854.

1. **Holacantha emoryi** A. Gray, Mem. Amer. Acad. II. 5: 310. 1854.

Reported from northern Sonora. Southern Arizona; type collected between Tucson and the Gila River.

Shrub, 2 to 3 meters high, much branched, the branches spinose, green or brownish; leaves reduced to small scales; flowers dioecious, small, solitary or clustered; fruit of 6 to 10 small drupes. "Corona de Cristo" (Arizona).

2. **CASTELA** Turp. Ann. Mus. Hist. Nat. 7: 78. 1806.

Shrubs or small trees, the branchlets spinose or spurlike; leaves small, narrow, simple, entire or nearly so; flowers small, dioecious, solitary or clustered; sepals 4, distinct or nearly so; petals 4; stamens 8; fruit of 1 or more small drupes.

Leaves green beneath, the pubescence not white ---------- 1. **C. peninsularis.**
Leaves covered beneath with a fine whitish pubescence.
  Petals narrowly obovate; leaves narrowly obovate ---------- 2. **C. texana.**
  Petals broadly obovate; leaves obovate or ovate.
    Leaves obtuse at apex ---------- 3. **C. tortuosa.**
    Leaves retuse ---------- 4. **C. retusa.**

1. **Castela peninsularis** Rose, Contr. U. S. Nat. Herb. 12: 278. 1909.

Castelaria peninsularis Small, N. Amer. Fl. 25: 231. 1911.

Dry plains and hillsides, Baja California; type from San José del Cabo.

Densely branched, spiny shrub, 1 meter high or less; leaves oval or broadly obovate, 1 to 2 cm. long, coriaceous; flowers red; petals 3 mm. long; fruit about 8 mm. long.

2. **Castela texana** (Torr. & Gray) Rose, Contr. U. S. Nat. Herb. 12: 278. 1909.

Castela nicholsoni texana Torr. & Gray, Fl. N. Amer. 1: 680. 1840.

Castelaria texana Small, N. Amer. Fl. 25: 231. 1911.

Castela salubris Boas, Beitr. Anat. Syst. Simarub. 44. 1912.

Dry plains and hillsides, Coahuila, Tamaulipas, and San Louis Potosí. Southwestern Texas.

Densely branched shrub, 1 to 2.5 meters high, with stiff whitish spinose branches; leaves 0.5 to 1.5 cm. long, obtuse; flowers bright red or purplish, about 3 mm. long; fruit red, 6 to 8 mm. long. "Bisbirinda" (Tamaulipas); "amargoso" (Nuevo León, Texas); "chaparro amargoso" (Texas).

A decoction of the very bitter bark is employed in domestic medicine for fevers, intestinal disturbances, and eczema. It has astringent and perhaps tonic properties.

The type of *C. salubris* came from Tamaulipas, and the name is doubtless to be referred here. Collections from Oaxaca and Puebla also were cited; these are probably referable to *C. tortuosa*.

3. **Castela tortuosa** Liebm. Nat. For. Kjöbenhavn Vid. Medd. **1853**: 108. 1854.
Castelaria tortuosa Small, N. Amer. Fl. **25**: 231. 1911.
Puebla and Oaxaca; type from Tehuacán, Puebla.
Shrub, 1 to 2 meters high, with crooked spiny branches; leaves 0.8 to 1.5 cm. long; flowers reddish purple, 2.5 mm. long.

4. **Castela retusa** Liebm. Nat. For. Kjöbenhavn Vid. Medd. **1853**: 110. 1854.
Oaxaca; type from San Carlos.
Very spiny shrub; leaves lustrous on the upper surface. "Amargoso," "palo amargoso" (*Reko.*).
The writer has seen no material of this or of *C. tortuosa*.
The species of the genus are closely related, and it is doubtful whether all those listed above are distinct.

DOUBTFUL SPECIES.

CASTELA LYCHNOPHOROIDES Liebm. Nat. For. Kjöbenhavn Vid. Medd. **1853**: 111. 1854. Type from Tehuacán, Puebla. Referred doubtfully to the genus by Liebmann.

3. **ALVARADOA**[1] Liebm. Nat. For. Kjöbenhavn Vid. Medd. **1853**: 100. 1854.

1. **Alvaradoa amorphoides** Liebm. Nat. For. Kjöbenhavn Vid. Medd. **1853**: 100. 1854.
Alvaradoa mexicana Liebm.; Benth. Pl. Hartw. 344. 1857.
Southern Chihuahua to Jalisco and Chiapas; Yucatán and Campeche; type from Bolaños, Jalisco. Central America, West Indies, and southern Florida.
Tree, 3 to 8 meters high (reported to reach a height of 18 meters); leaves pinnate, the leaflets 19 to 51, oval or oblong, 1 to 2.5 cm. long, finely sericeous beneath; flowers small, dioecious, green or yellowish white, in long racemes; fruit a lanceolate samara 1 to 1.5 cm. long, pilose. "Bel-ciniché," "xbesinic-ché" (Yucatán, Maya); "palo de hormigas" (Yucatán); "plumajillo" (Guatemala); "pié de gallo" (Sinaloa); "tamarindillo" (Cuba).

4. **PICRELLA** Baill. Adansonia **10**: 150. 1871.

1. **Picrella trifoliata** Baill. Adansonia **10**: 150. *pl. 10.* 1871.
Described from plants cultivated at Paris, believed to be of Mexican origin; the plant is not known otherwise.
Slender shrub; leaves palmately 3-foliolate, the leaflets ovate, oval, or obovate, 1 to 2.5 cm. long, entire; flowers small, perfect, in small axillary panicles.

5. **SIMAROUBA** Aubl. Pl. Guian. **2**: 859. 1775.

1. **Simarouba glauca** DC. Ann. Mus. Paris **17**: 424. 1811.
Yucatán. Florida, West Indies, and Central America; probably also in northern South America; type from Cuba.
Tree, sometimes 30 meters high; leaves persistent, pinnate, the leaflets usually 11 to 21, oblong, 5 to 10 cm. long, glabrate, pale beneath; flowers small, greenish, in rather large loose panicles; fruit drupaceous, oval, 1.5 to 2 cm. long, red or dark purple; wood soft, brownish. "Xpaxakil" (Yucatán, Maya); "simaruba" (Costa Rica); "aceituno" (Nicaragua, El Salvador, Panama);

[1] The genus was named in honor of Pedro de Alvarado, one of the associates of Cortés.

"aceituno negrito" (Nicaragua); "jucumico" (El Salvador); "palo blanco" (Cuba).

In Costa Rica an infusion of the bark is used as a remedy for intermittent fevers. The fruit is edible.

6. **QUASSIA** L. Sp. Pl. ed. 2. 553. 1762.

1. **Quassia amara** L. Sp. Pl. ed. 2. 553. 1762.

Native of northern South America; cultivated in Colima, Guerrero, and Oaxaca, and apparently naturalized in some localities.

Small tree; leaf rachis winged, the leaflets usually 5, about 10 cm. long, thin, acute or acuminate, entire; flowers perfect, 2.5 to 4.5 cm. long, racemose or paniculate; fruit of usually 5 drupes, these 1 to 1.5 cm. long. "Cuasia."

7. **RECCHIA** Moc. & Sessé; DC. Reg. Veg. Syst. **1**: 411. 1818.

REFERENCE: Loesener & Solenreder, Verh. Bot. Ver. Brand. **47**: 35–62. 1905.

Trees; leaves pinnate, the leaflets large, alternate, entire; flowers small, in terminal panicles; fruit of 1 to 3 large drupes.

Leaflets 6 to 14 cm. long; petals 9 mm. long ---------- **1. R. connaroides.**
Leaflets 1 to 6 cm. long; petals 6.5 to 7.5 cm. long ---------- **2. R. mexicana.**

1. **Recchia connaroides** (Loes. & Solenr.) Standl.

Rigiostachys connaroides Loes. & Solenr. Verh. Bot. Ver. Brand. **47**: 37. 1905.

Oaxaca; type from Tlacolula.

Leaflets 5 or 7, puberulent beneath, 3 to 7 cm. wide, obtuse or rounded at apex; flowers about 2 cm. broad.

2. **Recchia mexicana** Moc. & Sessé; DC. Reg. Veg. Syst. **1**: 411. 1818.

Rigiostachys bracteata Planch. Lond. Journ. Bot. **6**: 30. 1847.

Rigiostachys roureoides Loes. & Solenr. Verh. Bot. Ver. Brand. **47**: 39. 1905.

Recchia bracteata Small, N. Amer. Fl. **25**: 235. 1911.

Colima to Oaxaca.

Tree, 5 to 6 meters high; leaflets 5 to 11, obtuse or rounded at apex, sometimes acutish, puberulent beneath; panicles sometimes 45 cm. long; flowers yellow, fragrant; drupes 1 to 1.5 cm. long. "Corazón bonito" (Oaxaca).

The wood is hard and valuable.

It may be that more than one species is represented here, but the material examined by the writer appears to be conspecific. The characters which have been reported as distinguishing the species appear to be of little value.

8. **PICRAMNIA** Swartz, Prodr. Veg. Ind. Occ. 27. 1788.

Trees or shrubs; leaves persistent, pinnate, the leaflets entire, opposite or alternate, petiolulate; flowers very small, dioecious, in spikelike or branched panicles; fruit baccate.

Panicles branched; petals and sepals each 5.
- Leaflets usually 3 to 9 ---------- **1. P. polyantha.**
- Leaflets 21 to 25 ---------- **2. P. xalapensis.**

Panicles simple, spikelike; petals and sepals each 3 or 4.
- Sepals and petals each 4 ---------- **3. P. tetramera.**
- Sepals and petals each 3.
  - Leaflets 2.5 cm. long or shorter ---------- **4. P. pistaciaefolia.**
  - Leaflets mostly 4 to 10 cm. long.
    - Leaflets copiously pubescent beneath at maturity ---------- **5. P. andicola.**
    - Leaflets nearly glabrous beneath at maturity.
      - Stamens included ---------- **6. P. lindeniana.**
      - Stamens exserted ---------- **7. P. antidesma.**

1. **Picramnia polyantha** (Benth.) Planch. Lond. Journ. Bot. **5**: 577. 1846.
Rhus polyantha Benth. Pl. Hartw. 60. 1840.
Puebla and Oaxaca; type from Villa Alta, mountains of Chinantla, Oaxaca.
Slender shrub; leaflets ovate to oblong-lanceolate, 5 to 10 cm. long, acuminate or long-acuminate, more or less pubescent beneath.

2. **Picramnia xalapensis** Planch. Lond. Journ. Bot. **5**: 577. 1846.
Known only from the type locality, Jalapa, Veracruz.
Leaflets narrowly ovate or lanceolate, 1.5 to 3.5 cm. long, glabrate; petals 2 to 2.5 mm. long, linear or linear-lanceolate.

3. **Picramnia tetramera** Turcz. Bull. Soc. Nat. Moscou **36**[1]: 598. 1863.
Chiapas and probably elsewhere; described from southern Mexico.
Leaflets 5 to 13, lanceolate, obtuse-acuminate, densely pubescent beneath; panicles longer than the leaves; fruit pubescent when young.

4. **Picramnia pistaciaefolia** Blake & Standl. Contr. U. S. Nat. Herb. **20**: 218. 1919.
Oaxaca; type from Cafetal San Rafael, Cerro Espino, altitude 800 meters.
Slender shrub; leaflets about 17, obtuse or subacuminate, sparsely pubescent beneath; panicles 15 to 20 cm. long; fruit 1 cm. long. "Cáscara amarga."
Used by the Indians as a remedy for syphilis.

5. **Picramnia andicola** Tulasne, Ann. Sci. Nat. III. **7**: 265. 1847.
Veracruz; type from mountains of Veracruz, at an altitude of 750 meters.
Slender shrub, copiously pubescent; leaflets 7 to 13, oblong, ovate-oblong, or obovate, 3 to 8.5 cm. long, obtuse-acuminate; flowers reddish green.

6. **Picramnia lindeniana** Tulasne, Ann. Sci. Nat. III. **7**: 266. 1847.
Known only from the type locality, Río Puyatapengo, Teapa, Tabasco.
Tree; leaflets 9 to 11, obliquely ovate or lanceolate, 5 to 8 cm. long; flowers white.

7. **Picramnia antidesma** Swartz, Prodr. Veg. Ind. Occ. 27. 1788.
?*Picramnia teapensis* Tulasne, Ann. Sci. Nat. III. **7**: 265. 1847.
Tepic to Chiapas and Tabasco. West Indies and Central America; type from Jamaica.
Shrub or tree, sometimes 6 meters high, glabrate; leaflets usually 7 to 13, oval to ovate-oblong, usually acuminate, bright green; flowers greenish white; fruit 1.5 cm. long, orange or red. "Chilillo" (Chiapas, *Seler*); "cáscara amarga" (Panama).
The leaves and bark are bitter, with a flavor resembling that of licorice. The bark was formerly exported to Europe, where it was used as a remedy for erysipelas and venereal diseases. In the West Indies it has been employed in domestic medicine for intermittent fevers and for gastric and intestinal affections.

DOUBTFUL SPECIES.

PICRAMNIA BONPLANDIANA Tulasne, Ann. Sci. Nat. III. **7**: 266. 1847. Type from Jalapa, Veracruz.

PICRAMNIA FESSONIA DC. Prodr. **2**: 66. 1825. Described from Mexico.

72. BURSERACEAE. Torchwood Family.

REFERENCE: Rose, N. Amer. Fl. **25**: 241–261. 1911.

Aromatic unarmed trees or shrubs; leaves alternate, estipulate, simple, pinnate, or bipinnate, the leaflets entire or crenate; flowers small, perfect or unisexual, usually paniculate; sepals 3 to 5, united below; petals as many as the

sepals and alternate with them, usually distinct; stamens twice as many as the petals, the filaments free; ovary 4 or 5-celled, the ovules usually 2 in each cell; fruit drupaceous, containing 1 to 5 stones.

Petals valvate in bud; leaves pinnately 5 or 7-foliolate, the leaflets large, entire. 1. ICICA.
Petals imbricate; leaves various 2. ELAPHRIUM.

1. ICICA Aubl. Pl. Guian. 1: 337. 1775.

1. **Icica copal** Schlecht. & Cham. Linnaea **5**: 601. 1830.
? *Icica leptostachya* Turcz. Bull. Soc. Nat. Moscou **31**[1]: 473. 1858.
Protium copal Engl. in DC. Monogr. Phan. **4**: 83. 1883.
Icica palmeri Rose, N. Amer. Fl. **25**: 260. 1911.
San Luis Potosí, Veracruz, and Oaxaca; type from Veracruz.
Tree; leaves pinnate, the leaflets 5 or 7, 10 to 18 cm. long, oblong, obtuse or rounded at apex, coriaceous, entire; flowers small, in axillary panicles. "Copal" (Veracruz).
Icica heptaphylla Aubl. has been reported from Yucatán, where it is said to be known as "copal" and "pom." The writer has seen no specimens of the genus from that State.

2. ELAPHRIUM Jacq. Enum. Pl. Carib. 3. 1760.

Shrubs or trees; leaves deciduous, simple, pinnate, or bipinnate, the leaflets entire or crenate, sometimes lobate; flowers small, solitary or in axillary panicles; fruit a small 3-angled drupe, containing a single large seed.

The species all have a strong and characteristic odor resulting from the oil contained in the plants. All or most of them yield a resin, known as "copal," which is used in various ways, especially in domestic medicine. It is employed particularly as a cement and for varnish, and is burned by the Indians as incense in the churches and during some of their pagan celebrations. The name copal, which is of Nahuatl origin, is now applied in commerce to resins which come from Africa, the East Indies, and South America, and, indeed, most of the commercial resins known as copal come from those regions. The following vernacular names are reported for plants of the genus whose specific determination is doubtful: "Tacamaca"; "papelillo" (Durango); "tecomaca;" "copalquahuitl" (Nahuatl; applied to various species); "suchicopal" (Colima, Veracruz, Jalisco); "sochicopal" (Colima, Veracruz); "copalxochitl" (Colima, Veracruz); "teponaxtle," "teponaxtli," "teponaztli;" "cirujano" (Morelos). The species are so closely related that many of the vernacular names are doubtless applied to more than a single one.

Petiole and rachis not winged.
  Leaves simple or unifoliolate.
    Leaves crenate.
      Flowers solitary, nearly sessile; leaves glabrous 1. E. subtrifoliatum.
      Flowers paniculate, on slender pedicels; leaves pubescent. 42. E. rhoifolium.
    Leaves entire.
      Leaves lance-oblong, more than twice as long as broad; pedicels long and slender 2. E. cerasifolium.
      Leaves ovate or oval, less than twice as long as broad; pedicels short and stout 3. E. simplicifolium.
  Leaves with 3 or more leaflets.

Leaflets crenate.
Leaflets 11 to 35.
Leaflets 2 to 4 cm. long, narrowly lanceolate_____4. **E. multijugum.**
Leaflets 1 to 1.5 cm. long, oblong_____5. **E. karwinskii.**
Leaflets 3 to 7.
Leaflets rounded or obtuse at apex_____1. **E. subtrifoliatum.**
Leaflets acute or acuminate.
Lateral nerves of the leaflets very numerous (about 20) and prominent_____6. **E. kerberi.**
Lateral nerves few, not conspicuous.
Leaflets acuminate_____ _____7. **E. lancifolium.**
Leaflets merely acute_____8. **E. trijugum.**
Leaflets entire.
Leaflets small, about 1 cm. long_____9. **E. schaffneri.**
Leaflets large, 3 to 12 cm. long or larger.
Ovary and fruit pubescent_____10. **E. grandifolium.**
Ovary and fruit glabrous.
Leaflets densely tomentose at maturity_____11. **E. heterophyllum.**
Leaflets glabrous at maturity or thinly pilose or puberulent.
Leaflets glaucescent beneath, with very prominent, reticulate venation_____12. **E. longipes.**
Leaflets green beneath, the venation not prominent.
13. **E. simaruba.**

Petiole and rachis winged, sometimes very narrowly so.
Leaves bipinnate.
Leaflets large, usually 1 to 2.5 cm. long.
Leaflets rounded at base_____14. **E. diversifolium.**
Leaflets acute at base_____15. **E. collinum.**
Leaflets small, most of them much less than 1 cm. long.
Leaflets coriaceous, densely pilose beneath; calyx lobes shorter than the petals_____16. **E. gracile.**
Leaflets comparatively thin, glabrous or nearly so; calyx lobes equaling or longer than the petals_____17. **E. bipinnatum.**

Leaves once pinnate.
Leaflets entire, never tomentose.
Leaflets linear, oblong, or rarely oval, 3 mm. wide or narrower.
Leaflets 5 to 9. Young branches pubescent_____18. **E. aridum.**
Leaflets more than 9 in all or most of the leaves.
Leaflets linear-oblong to oval_____19. **E. microphyllum.**
Leaflets narrowly linear_____20. **E. galeottianum.**
Leaflets lanceolate to broadly ovate or oval-elliptic, most of them more than 5 mm. wide_____21. **E. odoratum.**
Leaflets crenate or serrate, or, if entire, densely tomentose.
Leaflets glabrous beneath when mature, or pubescent only along the costa.
Leaflets about 25, linear-lanceolate_____22. **E. pringlei.**
Leaflets 3 to 15.
Leaflets long-attenuate or long-acuminate at apex.
Teeth of the leaflets very large and coarse___23. **E. penicillatum.**
Teeth of the leaves very small and appressed.
Leaflets 3 or 5_____25. **E. tecomaca.**
Leaflets usually 7 to 15.
Leaflets 7 or 9; inflorescence sessile or nearly so.
21. **E. odoratum.**
Leaflets 11 to 15; inflorescence slender-pedunculate.
26. **E. rubrum.**

Leaflets rounded to acute at apex.
Leaflets 3 ..... 27. E. biflorum.
Leaflets 5 or more.
Leaflets crenate with large coarse teeth.
Base of the leaflets acute or cuneate ..... 28. E. laxiflorum.
Base of the leaflets rounded or obtuse ..... 37. E. aloexylon.
Leaflets with very small appressed teeth.
Leaflets entire or with few distant obscure teeth. 21. E. odoratum.
Leaflets finely crenate along almost the whole margin. 29. E. fagaroides.
Leaflets conspicuously pubescent beneath even at maturity, on the surface as well as on the costa.
Teeth of the leaflets small and appressed or none.
Leaflets green beneath, sparsely puberulent ..... 21. E. odoratum.
Leaflets white-tomentose beneath.
Leaflets glabrate on the upper surface, narrowly lanceolate. 30. E. bicolor.
Leaflets pilose on the upper surface, oblong ..... 31. E. pannosum.
Teeth large and coarse.
Leaves at maturity thick-coriaceous, strongly bullate on the upper surface, densely pubescent on both surfaces.
Leaflets 11 to 21 in all or most of the leaves ..... 32. E. jorullense.
Leaflets 5 to 9.
Leaflets 1 to 1.5 cm. long ..... 33. E. schiedeanum.
Leaflets mostly 3 to 6 cm. long ..... 34. E. cuneatum.
Leaves thin at maturity, or if thick never bullate.
Fruit densely pubescent ..... 35. E. submoniliforme.
Fruit glabrous.
Leaflets at maturity glabrous on the upper surface, often lustrous, rarely pubescent, but then 12 mm. long or shorter.
Leaflets 9 to 19, with a few irregular crenations. 36. E. filicifolium.
Leaflets 5 to 9, regularly crenate.
Inflorescence pubescent, short-pedunculate ..... 37. E. aloexylon.
Inflorescence glabrous, long-pedunculate. 38. E. longipedunculatum.
Leaflets densely pubescent on the upper surface at maturity, usually 2 cm. long or larger.
Leaflets 15 to 21 ..... 39. E. sessiliflorum.
Leaflets 1 to 11.
Leaflets long-acuminate ..... 24. E. pubescens.
Leaflets obtuse.
Rachis conspicuously dentate ..... 40. E. excelsum.
Rachis entire.
Flowers nearly sessile ..... 41. E. queretarense.
Flowers slender-pedicellate ..... 42. E. rhoifolium.

1. **Elaphrium subtrifoliatum** Rose, N. Amer. Fl. 25: 244. 1911.
Terebinthus subtrifoliatus Rose, Contr. U. S. Nat. Herb. 10: 122. 1906.
Jalisco; type collected west of Bolaños.
Low glabrous shrub with dark reddish brown branchlets; leaflets 1 or 3, ovate-rhombic, 1 to 2.5 cm. long, rounded at apex.

2. **Elaphrium cerasifolium** (T. S. Brandeg.) Rose, N. Amer. Fl. **25**: 244. 1911.
Bursera cerasifolia T. S. Brandeg. Proc. Calif. Acad. II. **3**: 121. 1891.
Southern Baja California; type from San José del Cabo.
Small tree, 4 to 8 meters high, with reddish brown branchlets; leaves bright green, 3 to 6 cm. long, glabrous.

3. **Elaphrium simplicifolium** Schlecht. Linnaea **16**: 532. 1842.
Bursera schlechtendalii Engl. in DC. Monogr. Phan. **4**: 41. 1883.
Bursera jonesii Rose, Contr. U. S. Nat. Herb. **3**: 314. 1895.
Jalisco to Chiapas. Guatemala.
Shrub or small tree, 2 to 3 meters high, glabrous, with grayish or brownish branches; leaves 1 to 3.5 cm. long, rounded to acutish at apex.

4. **Elaphrium multijugum** (Engl.) Rose, N. Amer. Fl. **25**: 248. 1911.
Bursera multijuga Engl. in DC. Monogr. Phan. **4**: 42. 1883.
Colima (type locality) and perhaps elsewhere; not seen by the writer.
Leaflets acute, glabrous; panicles 1.5 to 3.5 cm. long; flowers greenish yellow. "Cuajiote amarillo" (*Engler*).

5. **Elaphrium karwinskii** (Engl.) Rose, N. Amer. Fl. **25**: 248. 1911.
Bursera karwinskii Engl. in DC. Monogr. Phan. **4**: 43. 1883.
Known only from the type locality, Tolimán, Querétaro.
Leaflets glabrous.

6. **Elaphrium kerberi** (Engl.) Rose, N. Amer. Fl. **25**: 247. 1911.
Bursera kerberi Engl. in DC. Monogr. Phan. **4**: 41. 1883.
Jalisco and Colima; type from Colima.
Shrub or small tree; bark peeling off in thin, reddish brown sheets; leaflets 3, sessile, oblong-lanceolate to oval-oblong, 4 to 9 cm. long, finely crenate-serrate, glabrous, usually cuspidate-acuminate.

7. **Elaphrium lancifolium** Schlecht. Linnaea **17**: 247. 1843.
Bursera lancifolia Engl. in DC. Monogr. Phan. **4**: 42. 1883.
Known only from the type collection, perhaps from Veracruz.
Leaflets 3 to 7, lanceolate, 5 to 6 cm. long, glabrous.

8. **Elaphrium trijugum** (Ramírez) Rose, N. Amer. Fl. **25**: 248. 1911.
Bursera trijuga Ramírez, Anal. Inst. Méd. Nac. Méx. **2**: 16. *pl. 2.* 1896.
Morelos; type from Distrito de Ayala.
Leaflets 7, 4 to 7.5 cm. long, glabrous. "Cuajiote chino."

9. **Elaphrium schaffneri** (S. Wats.) Rose, N. Amer. Fl. **25**: 245. 1911.
Bursera schaffneri S. Wats. Proc. Amer. Acad. **22**: 469. 1887.
San Luis Potosí; type from Morales Mountains.
Leaflets 3 to 7, obovate or suborbicular, glabrous.
Elaphrium obovatum (Turcz.) Rose[1] is a closely related species, if not the same as *E. schaffneri*. The type is from Orizaba.

10. **Elaphrium grandifolium** Schlecht. Linnaea **17**: 249. 1843.
Bursera cinerea Engl. in DC. Monogr. Phan. **4**: 43. 1883.
Bursera grandifolia Engl. in DC. Monogr. Phan. **4**: 45. 1883.
Elaphrium occidentale Rose, N. Amer. Fl. **25**: 246. 1911.
Sinaloa to Oaxaca and Veracruz.
Tree, 3 to 9 meters high or larger, the trunk often 45 cm. in diameter, the bark purplish green, finally peeling off in papery brownish sheets; leaf-

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[1] N. Amer. Fl. **25**: 245. 1911. *Bursera obovata* Turcz. Bull. Soc. Nat. Moscou 36 [1]: 614. 1863.

lets 3 to 9 (usually 5), 4 to 13 cm. long, abruptly acuminate at apex, copiously pubescent, at least beneath. "Palo mulato" (Oaxaca); "chutama" (Sinaloa).

The gum which exudes from the trunk is employed for caulking boats and glueing furniture.

11. Elaphrium heterophyllum (Engl.) Rose, N. Amer. Fl. **25**: 247. 1911.

Bursera heterophylla Engl. in DC. Monogr. Phan. **4**: 46. 1883.

Known only from the type locality, Tlaquiltenango, Morelos; not seen by the writer.

Leaflets 3 or 5, elliptic, 1.5 to 2 cm. long; panicles 6 to 8 cm. long.

12. Elaphrium longipes Rose, N. Amer. Fl. **25**: 246. 1911.

Terebinthus longipes Rose, Contr. U. S. Nat. Herb. **10**: 120. 1906.

Type from Matamoros, Puebla; perhaps also in Morelos.

Small glabrous tree, 3 to 4 meters high, with broad flat crown; leaflets 7 to 13, long-petiolulate, 2.5 to 5 cm. long, abruptly acuminate.

13. Elaphrium simaruba (L.) Rose, N. Amer. Fl. **25**: 246. 1911.

Pistacia simaruba L. Sp. Pl. 1026. 1753.

Bursera gummifera L. Sp. Pl. ed. 2. 471. 1762.

? *Elaphrium ovalifolium* Schlecht. Linnaea **17**: 248. 1843.

Bursera simaruba Sarg. Gard. & For. **3**: 260. 1890.

Terebinthus arborea Rose, Contr. U. S. Nat. Herb. **10**: 118. 1906.

Terebinthus acuminata Rose, Contr. U. S. Nat. Herb. **12**: 278. 1909.

Terebinthus attenuata Rose, Contr. U. S. Nat. Herb. **12**: 278. 1909.

Elaphrium subpubescens Rose, N. Amer. Fl. **25**: 247. 1911.

Sinaloa to Tamaulipas, Veracruz, Yucatán, and Chiapas. Southern Florida, West Indies, Central America, and northern South America; type from Jamaica.

Tree, sometimes 25 meters high, with a trunk a meter in diameter, but usually much smaller, the branches thick and spreading; bark reddish brown, smooth, peeling off in thin sheets; leaflets usually 5 or 7, 4 to 14 cm. long, variable in shape, usually acuminate or cuspidate-acuminate, commonly more or less pubescent; flowers greenish or yellowish, sweet-scented; wood light brown, soft, weak, its specific gravity about 0.30. "Palo mulato" (Tepic, Chiapas, Tabasco, Oaxaca, Veracruz); "quiote" (Sinaloa); "palo jiote" (Chiapas, Veracruz, Guatemala, Honduras, El Salvador); "chacah" or "chaca" (Yucatán, Tamaulipas, Veracruz); "piocha" (Tamaulipas); "zongolica" (Oaxaca); "palo colorado," "mulato" (Sinaloa); "archipín"; "almácigo" (Porto Rico, Costa Rica, Santo Domingo, Panama, Colombia); "jiñocuabo," "jiñicüite" (Nicaragua); "jiote" (Sinaloa, Honduras, Guatemala); "jiñocuave," "carana," "jiñocuavo," "jiñote" (Costa Rica); "almácigo encarnado" (Porto Rico); "jicote," "chino," "chinacahuite" (Guatemala); "copón" (Honduras); "almácigo blanco" (Cuba, Santo Domingo); "almácigo colorado," "almácigo amarillo," "cachibú" (Cuba); "indio desnudo," "pellejo de indio" (Guiana); "palo chino" (Guatemala, Honduras).

The branches take root easily when placed in the ground, and the tree is often planted for shade or to form hedges. The wood, which has a strong characteristic odor, is not very durable, but it is employed for fence posts and canoes, and is burned for charcoal. From the branches a brownish gum exudes, which is often used as a substitute for glue and as a cement for mending broken china and glass. The gum is known in Costa Rica as "elequeme" and "tacamahaca." The Caribs employed it for painting their canoes to preserve them from the attacks of worms. The tree is much used in domestic medicine, the gum and sometimes the leaves being the parts employed. Diaphoretic, purgative, diuretic, and expectorant properties are attributed to it, and it is

employed for dysentery, dropsy, venereal diseases, yellow fever, and other affections.

In Florida the tree is known as "gumbolimbo," a name used also by the Jamaican negroes, an apparent corruption of "goma elemí," the name sometimes given by the Spaniards to the gum.[1] The fruit is eaten by birds and pigs.

For an illustration of *Elaphrium simaruba* see Contr. U. S. Nat. Herb. **8**: *pl. 21.*

14. **Elaphrium diversifolium** Rose, N. Amer. Fl. **25**: 248. 1911.

Bursera diversifolia Rose, Contr. U. S. Nat. Herb. **5**: 113. 1897.

Chiapas; type collected between Ocuilapa and Tuxtla.

Tree, 3.5 to 7.5 meters high, copiously pubescent; leaflets 9 to 13, the lower ones pinnate, or the leaves often simply pinnate.

15. **Elaphrium collinum** (T. S. Brandeg.) Rose, N. Amer. Fl. **25**: 248. 1911.

Bursera collina T. S. Brandeg. Zoe **5**: 204. 1905.

Known only from the type locality, Cofradía, Sinaloa.

Leaves copiously pubescent.

16. **Elaphrium gracile** (Engl.) Rose, N. Amer. Fl. **25**: 249. 1911.

Bursera gracilis Engl. in DC. Monogr. Phan. **4**: 50. 1883.

Jalisco to Morelos and Chiapas; type from Xochiculco, Oaxaca. Guatemala.

Tree, sometimes 9 meters high; flowers greenish white; fruit green or brownish red. "Copal santo," "copal chino colorado," "incienso del país" (Oaxaca, *Reko*); "copal" (Guatemala).

It is not certain that this is specifically distinct from the next species.

17. **Elaphrium bipinnatum** (DC.) Schlecht. Linnaea **17**: 631. 1843.

Amyris bipinnata DC. Prodr. **2**: 82. 1825.

Bursera bipinnata Engl. in DC. Monogr. Phan. **4**: 49. 1883.

Sinaloa and southern Chihuahua to Guerrero and Morelos.

Shrub or small tree, sometimes 12 meters high, with a trunk 50 cm. in diameter; leaves fernlike, with very numerous small leaflets. "Jabencillo" (Chihuahua); "copal chino," "copal amargo" (Michoacán); "copal amargoso" (Guerrero, *Ramírez*); "incienso del país," "tetlate," "tetlatía" (Morelos, *Ramírez*); "tetlatián," "tetlatín" (*Ramírez*); "copal amargo" (*Conzatti*); "palo copal" (Sinaloa); "cuajiote colorado" (*Villada*).

The resin is employed in Sinaloa for treating wounds.

18. **Elaphrium aridum** Rose, N. Amer. Fl. **25**: 249. 1911.

Terebinthus arida Rose, Contr. U. S. Nat. Herb. **10**: 118. 1906.

Known only from the vicinity of the type locality, dry hills about Tehuacán, Puebla.

Low shrub; leaflets green, 4 to 6 mm. long, rounded at apex, glabrous or nearly so.

19. **Elaphrium microphyllum** (A. Gray) Rose, N. Amer. Fl. **25**: 250. 1911.

Bursera microphylla A. Gray, Proc. Amer. Acad. **5**: 155. 1861.

Bursera morelensis Ramírez, Anal. Inst. Méd. Nac. Méx. **2**: 17. 1896.

Terebinthus multifolia Rose, Contr. U. S. Nat. Herb. **10**: 120. 1906.

Dry plains and hillsides, Sonora and Baja California to Zacatecas, Morelos, and Puebla; type from Baja California. Southern Arizona.

Shrub or tree, sometimes 9 meters high, with reddish branches; leaflets usually 11 to 35, obtuse, glabrous. "Torote" (Sonora, Baja California); "torote blanco" (Sonora); "copal" (Baja California); "cuajiote colorado" (Morelos).

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[1] See W. E. Safford, Natural history of Paradise Key and the near-by Everglades of Florida, Smithson. Rep. **1917**: 377–434. *pl. 1–64.* 1920.

The bark is used for tanning and dyeing, and has been exported for that purpose from Baja California. The Indians of Sonora are said to use the branches for basketry. An infusion of the bark or gum is a popular remedy for venereal diseases.

It may be that more than one species should be recognized here, but the characters that have been cited as distinguishing the three species here combined do not hold for the material examined by the writer.

20. Elaphrium galeottianum (Engl.) Rose, N. Amer. Fl. **25**: 249. 1911.

Bursera galeottiana Engl. in DC. Monogr. Phan. **4**: 47. 1883.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Small tree; leaflets 13 to 25, glabrous. "Cuajiote colorado" (Oaxaca, *Villada*).

Very closely related to *E. microphyllum*, and perhaps only a form of it. The leaflets, however, are narrower, and the pubescence usually more abundant.

21. Elaphrium odoratum (T. S. Brandeg.) Rose, N. Amer. Fl. **25**: 250. 1911.

Bursera odorata T. S. Brandeg. Proc. Calif. Acad. II. **2**: 138. 1889.

Bursera tenuifolia Rose, Contr. U. S. Nat. Herb. **3**: 314. 1895.

Bursera aptera Ramírez, Anal. Inst. Méd. Nac. Méx. **2**: 16. 1896.

Bursera purpusii T. S. Brandeg. Zoe **5**: 249. 1908.

Elaphrium covillei Rose, N. Amer. Fl. **25**: 250. 1911.

Elaphrium confusum Rose, N. Amer. Fl. **25**: 251. 1911.

Elaphrium brachypodum Rose, N. Amer. Fl. **25**: 253. 1911.

Sonora and Baja California to Morelos and Puebla; type from San Gregorio, Baja California.

Shrub or small tree; bark yellow, peeling off in thin papery sheets; leaflets 5 to 11, 1 to 3.5 cm. long, acute to rounded at apex, entire or obscurely crenulate, usually glabrous but sometimes sparsely pubescent beneath. "Cuajiote verde" (Morelos); "torote" (Baja California, Sinaloa); "chutama" (Sinaloa).

The gum is applied to cure scorpion stings, insect bites, and other wounds. It is yellowish, brown, or almost black, odorless, acrid, and bitter, and is reputed to have expectorant and drastic purgative properties. It is used also for mending broken dishes. The bark is employed for tanning hides.

The species is a variable one, the leaves varying greatly upon the same plant. All the names listed above refer to very closely related forms, which it seems impossible to separate by any constant character. For an illustration of a tree see Contr. U. S. Nat. Herb. **16**: *pl. 115*.

This is probably the species figured by Hernández and described[1] in a chapter entitled "De Cuitlacopalli seu Stercore Copallis, Copallifera VI."

22. Elaphrium pringlei (S. Wats.) Rose, N. Amer. Fl. **25**: 252. 1911.

Bursera pringlei S. Wats. Proc. Amer. Acad. **25**: 145. 1890.

Jalisco; type from bluffs of the Río Grande de Santiago, near Guadalajara.

Small tree; leaflets linear-lanceolate, 2 to 4 cm. long, dark green above, pale beneath; flowers purplish. "Cuajiote colorado."

23. Elaphrium penicillatum DC. Prodr. **1**: 724. 1824.

Bursera graveolens pilosa Engl. in DC. Monogr. Phan. **4**: 49. 1883.

Bursera penicillata Engl. in DC. Monogr. Phan. **4**: 52. 1883.

Elaphrium pilosum Rose, N. Amer. Fl. **25**: 251. 1911.

Southern Chihuahua and Sinaloa to Jalisco.

Shrub, 1 to 3 meters high; leaflets 7 to 15, thin, 4 to 8 cm. long.

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[1] Thesaurus 48. 1651.

24. Elaphrium pubescens Schlecht. Linnaea **16**: 527. 1842.

Yucatán and Campeche; type from Campeche.

Tree, about 15 meters high; leaflets usually 7, 3 to 5 cm. long. "Nabanché" (Yucatán).

Said to be cultivated in Yucatán and possibly an introduced species; very closely related to *Elaphrium graveolens* H. B. K. (as which it has been reported from Yucatán) of South America.

25. Elaphrium tecomaca (DC) Standl.

Amyris tecomaca DC. Prodr. **2**: 82. 1825.

Bursera fragilis S. Wats. Proc. Amer. Acad. **21**: 422. 1886.

Amyris sylvatica Sessé & Moc. Fl. Mex. ed. 2. 93. 1894. Not *A. sylvatica* Jacq. 1763.

Sinaloa and southern Chihuahua. Type (according to Sessé and Mociño) from mountains near Mazatlán (Guerrero?).

Tree, 3 to 5 meters high, glabrous, the trunk 5 to 8 cm. in diameter; leaflets 3 or 5, lanceolate or narrowly lanceolate, 3 to 6 cm. long, finely crenate-serrate. "Torote" (Chihuahua).

Sessé and Mociño give the vernacular name as "tacamahaca," and state that the gum was used for healing wounds.

26. Elaphrium rubrum Rose, N. Amer. Fl. **25**: 252. 1911.

Terebinthus rubra Rose, Contr. U. S. Nat. Herb. **10**: 121. 1906.

Sonora and Sinaloa; type collected near Colomas, Sinaloa.

Shrub or small tree; leaflets 2 to 4 cm. long, bright green, glabrous.

27. Elaphrium biflorum Rose, N. Amer. Fl. **25**: 253. 1911.

Terebinthus biflora Rose, Contr. U. S. Nat. Herb. **10**: 119. 1906.

Puebla; type from Tehuacán.

Shrub or tree, 2 to 5 meters high, with short branches; leaflets 1 to 3 cm. long, glabrate, crenate.

28. Elaphrium laxiflorum (S. Wats.) Rose, N. Amer. Fl. **25**: 253. 1911.

Bursera laxiflora S. Wats. Proc. Amer. Acad. **24**: 44. 1889.

Dry hillsides, Sonora and Sinaloa; type from Guaymas, Sonora.

Shrub or small tree with reddish brown branches; leaflets 5 to 9, most of them less than 1 cm. long, very coarsely crenate or rarely entire. "Copal" (Sonora, Sinaloa); "torote prieto" (Sonora).

29. Elaphrium fagaroides H. B. K. Nov. Gen. & Sp. **7**: 27. *pl. 611.* 1824.

Bursera fagaroides Engl. in DC. Monogr. Phan. **4**: 48. 1883.

Durango to Puebla; type from Querétaro.

Tree with brown branches; leaflets usually 5 or 7 and 1 to 2 cm. long. "Cuajiote amarillo" (Morelos, *Urbina*); "cuajiote colorado" (San Luis Potosí, *Ramírez*).

30. Elaphrium bicolor Schlecht. Linnaea **17**: 625. 1843.

Bursera bicolor Engl. in DC. Monogr. Phan. **4**: 53. 1883.

Morelos; type from Real de Cuautla.

Small tree with rounded crown; leaflets 9 to 19, 3.5 to 8 cm. long, densely white-tomentose beneath; panicles lax, 10 to 20 cm. long.

31. Elaphrium pannosum (Engl.) Rose, N. Amer. Fl. **25**: 254. 1911.

Bursera pannosa Engl. in DC. Monogr. Phan. **4**: 54. 1883.

Known only from the type locality, Mirador, Veracruz; not seen by the writer.

Leaflets 9, acute, 1.5 to 2 cm. long.

32. Elaphrium jorullense H. B. K. Nov. Gen. & Sp. **7**: 28. *pl. 612.* 1824.

Elaphrium lanuginosum H. B. K. Nov. Gen. & Sp. 7: 31. 1824.

Bursera jorullensis Engl. in DC. Monogr. Phan. **4**: 57. 1883.

Bursera palmeri glabrescens S. Wats. Proc. Amer. Acad. **25**: 145. 1890.

Bursera glabrescens Rose, Contr. U. S. Nat. Herb. **3**: 313. 1895.

Durango to Puebla and Guerrero; type from Jorullo, Michoacán.

Shrub or tree, sometimes 7.5 meters high, with brown bark; leaflets 2 to 4 cm. long, densely pubescent, strongly rugose. "Copal" (Morelos, *Urbina*); "copal blanco," "copal de penca" (Morelos, *Ramírez*); "copal santo" (Morelos, Michoacán, *Ramírez*); "ngedni," "ngidi" (Otomí); "copalli," "goma de limón," "elemí de México" (*Nueva Farmacopea Mexicana*); copalquahuitl" (Nahuatl).

The copal or resin of this tree is reddish and burns readily. It is usually gathered in September and October from incisions in the trunk, the juice being collected on maguey leaves, hence the name of "copal de penca." Dissolved in turpentine the resin gives a transparent and very glossy varnish. The copal is used in Mexico as a substitute for gum elemi. It is employed in treating uterine diseases and in making ointments, and smoke from it is inhaled as a remedy for headache.

This may be the species figured by Hernández and described[1] in a chapter headed "De Copalliquahuitl Patlahoac, seu Arbore Copalli latifolia, Copallifera II."

33. Elaphrium schiedeanum (Engl.) Rose, N. Amer. Fl. **25**: 256. 1911.

Bursera schiedeana Engl. in DC. Monogr. Phan. **4**: 57. 1885.

Known only from the type locality, Cuautla, Morelos; not seen by the writer.

Leaflets 7 or 9, pubescent on both surfaces.

34. Elaphrium cuneatum Schlecht. Linnaea **17**: 629. 1843.

Bursera cuneata Engl. in DC. Monogr. Phan. **4**: 56. 1883.

Guanajuato, Mexico, and Guerrero; type from Tlamixtlahuaca, Guerrero.

Leaflets 7 or 9, oblong or lance-oblong, very rugose, densely pubescent beneath.

35. Elaphrium submoniliforme (Engl.) Marchand; Rose, N. Amer. Fl. **25**: 255. 1911.

Bursera submoniliformis Engl. in DC. Monogr. Phan. **4**: 55. 1883.

Oaxaca; type from Río Vueltas.

Leaflets 7 to 13, oblong or oval, 1 to 3 cm. long, densely pubescent.

36. Elaphrium filicifolium (T. S. Brandeg.) Rose, N. Amer. Fl. **25**: 254. 1911.

Bursera filicifolia T. S. Brandeg. Zoe **5**: 248. 1908.

Sonora and Baja California; type from Rancho Colorado, Baja California.

Small tree with brownish branches; leaflets usually 1 cm. long or shorter, bright green.

37. Elaphrium aloexylon Schiede, Linnaea **17**: 252. 1843.

Bursera aloexylon Engl. in DC. Monogr. Phan. **4**: 52. 1883.

Bursera nelsoni Rose, Contr. U. S. Nat. Herb. **3**: 314. 1895.

Morelos, Puebla and Oaxaca; type from Real de Cuautla, Morelos.

Shrub or small tree; leaflets usually 7 or 9, 1 to 2 cm. long or sometimes larger, pubescent when young but often glabrate in age. The following vernacular names are reported, but it is uncertain whether they belong exclusively, or at all, to this species: "Linaloé," "inanué," "linalué," "xochicopal"; "cuajiote colorado" (Oaxaca, *Villada*).

By distillation there is obtained from the wood or fruit an oil which is used in the manufacture of perfumes. The wood, which is yellow and very fragrant, is said to have been exported to England.

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[1] Thesaurus 46. 1651.

This is probably the species figured by Hernández and described[1] in a chapter entitled "De Copalli Quahuitl, seu Arbore Gummifera Copallifera I."

E. glabrifolium H. B. K.[2] described from Michoacán, may be the same species.

38. **Elaphrium longipedunculatum** Rose, N. Amer. Fl. **25**: 254. 1911.

Puebla and Oaxaca; type from Almoloyas, Oaxaca.

Tree with reddish branches; leaflets 5 or 7, densely pubescent or glabrate, 1.5 to 4 cm. long.

39. **Elaphrium sessiliflorum** (Engl.) Rose, N. Amer. Fl. **25**: 254. 1911.

Bursera sessiliflora Engl. in DC. Monogr. Phan. **4**: 55. 1883.

Bursera asplenifolia T. S. Brandeg. Univ. Calif. Publ. Bot. **3**: 382. 1909.

Puebla and Oaxaca.

Leaflets 15 to 21, 3 to 7 cm. long, densely pubescent.

40. **Elaphrium excelsum** H. B. K. Nov. Gen. & Sp. **7**: 30. 1824.

Bursera excelsa Engl. in DC. Monogr. Phan. **4**: 57. 1883.

Bursera palmeri S. Wats. Proc. Amer. Acad. **22**: 402. 1887.

Durango and Sinaloa to Chiapas; type collected between Acapulco and El Exido, Guerrero. Guatemala.

Shrub or tree, 3 to 6 meters high, with reddish bark; leaflets 5 to 9, 2.5 to 5 cm. long, coarsely crenate, densely pubescent. "Sisiote" (Guanajuato); "copalquín" (Durango); "copal" (Guerrero, Oaxaca, Guatemala).

41. **Elaphrium queretarense** Rose, N. Amer. Fl. **25**: 254. 1911.

Querétaro; type collected near the city of Querétaro.

Tree, 4 to 5 meters high; leaflets 7 to 9, 1 to 3 cm. long, densely pubescent.

Probably only a form of *E. excelsum*.

42. **Elaphrium rhoifolium** Benth. Bot. Voy. Sulph. 10. 1844.

Elaphrium hindsianum Benth. Bot. Voy. Sulph. 11. 1844.

Terebinthus macdougalii Rose, Torreya **6**: 170. 1906.

Elephrium epinnatum Rose, N. Amer. Fl. **25**: 243. 1911.

Elaphrium goldmani Rose, N. Amer. Fl. **25**: 256. 1911.

Baja California, the type from Magdalena Bay; a closely related plant, perhaps of the same species, occurs in Puebla.

Shrub or small tree, 7.5 meters high or less, with reddish brown branches; leaves simple or pinnately 3 or 5-foliolate, copiously pubescent. "Copal."

The bark is used locally for tanning.

DOUBTFUL SPECIES.

BURSERA DELPECHIANA Poisson; Engl. in DC. Monogr. Phan. **4**: 53. 1883. Type from Mexico.

BURSERA MEXICANA Engl. in DC. Monogr. Phan. **4**: 51. 1883. Type from San Luis Potosí.

ELAPHRIUM ARIENSE H. B. K. Nov. Gen. & Sp. **7**: 31. 1824. Type from Michoacán.

ELAPHRIUM COPALLIFERUM DC. Prodr. **1**: 724. 1824. Type from Mexico.

ICICA SERRATA DC. Prodr. **2**: 77. 1825. Type from Mexico.

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[1] Thesaurus 45. 1651.

[2] Nov. Gen. & Sp. **7**: 28. 1824.

73. MELIACEAE. Chinaberry Family.

(Contributed by S. F. Blake.)

Trees or shrubs; leaves alternate, estipulate, usually pinnate; flowers regular, hermaphrodite (in ours); calyx 4 or 5-lobed or parted; petals 4 or 5, free or adnate to the disk; stamens 5, 8, or 10, usually united into a tube (free in *Cedrela*); disk annular or stipitiform, sometimes elongate; ovary free, 2 to 5-celled; ovules usually 2, sometimes 1 or 12; style simple; stigma disk-shaped or pyramidate; fruit capsular, rarely drupaceous.

Filaments united at least to middle.
  Leaves bipinnate; fruit drupaceous ..... 1. **MELIA.**
  Leaves once pinnate; fruit a capsule.
    Anthers borne on apex of the staminal tube or of its lobes. 2. **TRICHILIA.**
    Anthers borne inside the apex of the staminal tube.
      Ovules 1 or 2 in each cell; seeds not winged ..... 3. **GUAREA.**
      Ovules 12 in each cell; seeds winged ..... 4. **SWIETENIA.**
Filaments free ..... 5. **CEDRELA.**

1. MELIA L. Sp. Pl. 384. 1753.

REFERENCE: C. De Candolle in DC. Monogr. Phan. 1: 450–459. 1878.

1. **Melia azedarach** L. Sp. Pl. 384. 1753.

Melia azedarach α *glabrior* C. DC. in DC. Monogr. Phan. 1: 452. 1878.

Escaped from cultivation throughout Mexico. Native of the Old World; escaped from cultivation from the southwestern United States southward.

Tree, up to 15 meters high; leaves bipinnate, the leaflets toothed; flowers panicled, pink or lilac, sweet-scented; sepals 5; petals 5; filaments united into a tube, this 20-toothed at apex; anthers 10, sessile inside the apex of the tube; fruit a 4-seeded translucent drupe. "Paraíso" (Michoacán, Yucatán, Veracruz, San Luis Potosí, Oaxaca, Costa Rica, Argentina, Uruguay, Philippines, Colombio, Cuba, Guatemala); "piocha" (Oaxaca); "canelo" (Nuevo León, San Luis Potosí); "paraíso morado" (*Herrera*); "lila" (Chihuahua, Santo Domingo); "paraguas chino" (Chihuahua); "lila de las Indias," "lila de China" (*Nuevo Farm. Mex.*); "jacinto" (Panama); "lilaila," "pasilla" (Porto Rico); "árbol de quitasol" (Cuba).

The chinaberry (known also as china-tree, pride of India, and umbrella-tree) is much planted in Mexican parks and gardens. It grows very rapidly, but the trees do not last long and the branches are easily broken off. Both flowers and fruit are borne in great profusion, and the yellowish fruits hang on the tree a long time. The wood is soft and weak. The large seeds are sometimes used as beads, and oil has been extracted from them.

The bark contains a bitter principle, mangrovin. The roots have a bitter, nauseous taste; they have been widely used as an anthelmintic but their efficacy is doubtful. The leaves are reported to have emetic properties, and they have been employed as a febrifuge and as a remedy for hysteria. The fruit is eaten by cattle, but it is generally reputed to be poisonous to human beings. The bark is said to be used in some regions for stupefying fish. In the southern United States there is a belief that if horses eat the fruits they will be protected against attacks of bots. It is said also that the berries packed with dried fruit will prevent the attacks of insects and that if laid among clothes they will keep away moths. A decoction of the fruits sprinkled over growing plants is reported to guard them from injury by cutworms and other insects.

The specific name *azedarach* is of Arabic origin. For an illustration of the chinaberry see Contr. U. S. Nat. Herb. **8**: *pl. 45.*

2. TRICHILIA L. Syst. Nat. ed. 10. 1020. 1759.

REFERENCE: C. De Candolle in DC. Monogr. Phan. 1: 646–713. 1878.

Leaves abruptly pinnate, rarely odd-pinnate; panicles axillary, rarely terminal; calyx 4 or 5-toothed or lobed, rarely 5-sepaled; petals 4 or 5, rarely 3; filaments connate below or to apex into a tube, the anthers borne at apex of the tube or of the lobes; ovary 2 to 4-celled, the ovules 1 or 2, superposed or collateral; capsule usually 3-valved and 3-seeded; seeds arillate.

Filaments connate nearly or quite to apex into a denticulate tube.
- Ovary glabrous ---------- 1. **T. havanensis.**
- Ovary pubescent ---------- 2. **T. oligantha.**

Filaments connate for two-thirds their length or less.
- Leaflets 3 ---------- 3. **T. parvifolia.**
- Leaflets more than 3.
  - Anthers pubescent.
    - Petals densely puberulous or tomentose outside; leaflets very densely and softly fulvescent-pilosulous beneath along nerves or over whole surface ---------- 4. **T. cuneata.**
    - Petals sparsely puberulous or glabrous; leaflets sparsely puberulous to pilose chiefly along the veins beneath.
      - Leaflets 8, oval or obovate-oval, the larger 14 cm. long, 5.7 cm. wide; petals sparsely puberulous ---------- 5. **T. oaxacana.**
      - Leaflets 11 to 21, lanceolate to elliptic, the larger 5 to 8 cm. long, 1 to 3 cm. wide; petals glabrous or sparsely pubescent above.
        - Disk about equaling the ovary ---------- 6. **T. karwinskyana.**
        - Disk much shorter than ovary ---------- 7. **T. hirta.**
  - Anthers glabrous.
    - Petals densely tomentose-puberulous outside; panicles terminal, corymbed. 8. **T. arborea.**
    - Petals glabrous outside; panicles axillary.
      - Petals 5 to 6 mm. long.
        - Panicle half to two-thirds as long as the leaves; free portion of filaments sparsely pilose within ---------- 9. **T. pringlei.**
        - Panicle equaling the leaves; free portion of filaments densely hirsute within ---------- 10. **T. pavoniana.**
      - Petals 4 mm. long.
        - Calyx teeth obtuse or rounded; ovules 2, superposed ---- 11. **T. colimana.**
        - Calyx teeth acute; ovules 2, collateral ---------- 12. **T. wawrana.**

1. Trichilia havanensis Jacq. Enum. Pl. Carib. 20. 1760.

Trichilia havanensis β lanceolata C. DC. in DC. Monogr. Phan. 1: 677. 1878.

Trichilia havanensis var. *spathulata* Rose, Contr. U. S. Nat. Herb. 1: 314. 1895.

Tamaulipas to Sinaloa and Oaxaca. Central America and West Indies; type from Cuba.

Shrub or small tree; leaflets 3 to 9, obovate or cuneate-obovate, 3.5 to 15 cm. long, essentially glabrous, usually subcoriaceous; panicles umbelliform, dense, usually about 1.5 cm. long; petals glabrous, 3 mm. long; anthers, ovary, and style glabrous. "Limoncillo" (Oaxaca, Honduras); "cucharillo," "estribillo" (Tamaulipas); "uruca" (Costa Rica); "garrapatilla" (Colima); "cauache" (Sinaloa); "barre-horno" (El Salvador); "siguaraya" (Cuba).

The wood is used in Mexico for making spoons and other small articles. The cream-colored sweet-scented flowers are much visited by bees. In Costa Rica the branches are employed for decorating the interiors of houses and churches. The leaves and fruit are reputed to be poisonous.

2. **Trichilia oligantha** C. DC. in DC. Monogr. Phan. **1**: 693. 1878.

Mexico, without locality.

Branchlets villosulous; leaflets 9, the blades lance-oblong, the larger 10 cm. long, 3 cm. wide, short-cuspidate, glabrous above except on costa, beneath softly pubescent; panicles branched, few-flowered, densely hirtellous; calyx teeth 4, acute; petals glabrous, 2 mm. long; anthers glabrous.

3. **Trichilia parvifolia** C. DC. Ann. Cons. Jard. Genève **10**: 159. 1907.

Sinaloa to Guerrero and Veracruz; type from Mexico, without definite locality. Nicaragua.

Shrub, up to 4 meters high; leaflets obovate or cuneate-obovate, 2 to 4.5 cm. long, emarginate, usually thick, sparsely hairy on the veins and in the axils beneath, or subglabrous; panicles axillary, 1 cm. long or less; petals 5, glabrous, 3 mm. long; anthers glabrous; ovary and style hirsute; capsule about 6 mm. thick, pubescent, 3-seeded; seeds 4 mm. long.

This species is closely related to *T. trifolia* L., of Venezuela, and may not be distinct.

4. **Trichilia cuneata** Radlk. Sitzungsb. Math. Phys. Akad. München **9**: 642. 1879.

Trichilia heydeana C. DC. Bot. Gaz. **19**: 3. 1894.

Chiapas. Guatemala and El Salvador; type from Guatemala.

Middle-sized tree; leaflets 7 to 11, obovate or elliptic-oblong, 5 to 15 cm. long, obtuse to short-pointed; panicles dense, 7 to 20 cm. long, densely fulvescent-pilosulous; calyx deeply 5-toothed, the teeth acute; petals 3.2 mm. long.

5. **Trichilia oaxacana** Blake, Contr. Gray Herb. n. ser. **53**: 58. 1918.

Known only from the type locality, Cafetal Concordia, Department Pochutla, Oaxaca.

Leaflets 8, oval or obovate-oval, the larger 14 cm. long, 5.7 cm. wide, obtusely acuminate, sparsely puberulous on the veins beneath; panicle 16 cm. long, on a peduncle 11 cm. long; calyx 1 mm. long, the 5 teeth acute; petals 3.5 mm. long; anthers pilose on margin; style sparsely pilose.

6. **Trichilia karwinskyana** C. DC. in DC. Monogr. Phan. **1**: 663. 1878.

Known only from the type locality, Papantla, Veracruz.

Leaflets 13 to 15, the blades lanceolate, 7 cm. long, 2.5 cm. wide, membranaceous, long-cuspidate, appressed-pilosulous on costa above and on nerves beneath; panicles exceeding the petioles, densely hirtellous, the flowers crowded; petals glabrous, acute, 4 mm. long.

7. **Trichilia hirta** L. Syst. Nat. ed. 10. 1020. 1759.

Trichilia spondioides Jacq. Enum. Pl. Carib. 20. 1760.

Trichilia schiedeana var. *purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 274. 1912.

General nearly throughout Mexico. Central and South America; West Indies; type from Jamaica.

Shrub or small tree, 3 to 20 meters high; leaflets 11 to 21, the blades lance-ovate or elliptic, 2.5 to 8 cm. long, pilose along the veins, especially beneath, or glabrescent; panicles 3 to 13 cm. long; petals 4 mm. long, sparsely pubescent dorsally or subglabrous; capsules essentially glabrous, about 15 mm. thick; seeds 3, subglobose, 6 mm. thick. "Garbancillo" (Sonora); "xkulinsis" (Yucatán); "cabo de hacha" (Oaxaca, Cuba, Porto Rico); "mata-piojo" (Nicaragua); "jubabán," "guabán" (Cuba); "guaita," "jobillo," "molinillo," "palo de Anastasio," "retamo" (Porto Rico).

PA Dept of Environmental Protection

The compact, yellowish or brownish wood is used for carpentry and for making canoes, carts, and other articles. The root is said to have strong purgative properties.

8. **Trichilia arborea** C. DC. Bull. Herb. Boiss. II. **5**: 426. 1905.

Yucatán. Costa Rica and Nicaragua; type from Nicoya, Costa Rica.

Tree, 15 to 20 meters high; leaflets 11, ovate to oblong, 3.5 to 6 cm. long, glabrate or puberulous above, short-pubescent on veins and surface beneath; panicles several, short, corymbed at apex of branches; petals 4.8 mm. long; style pubescent. "Choben-ché" (Yucatán, Maya).

This has been reported from Yucatán as *T. terminalis* Jacq. The bark is used there as a remedy for fevers.

9. **Trichilia pringlei** Rose, Contr. U. S. Nat. Herb. **8**: 50. 1903.

Known only from the type locality, Cuernavaca, Morelos.

Shrub or tree, 4 to 9 meters high; leaflets 15, elliptic or elliptic-ovate, 5 to 7 cm. long, sparsely appressed-pubescent on both sides at maturity, obtusely acuminate; panicles (including peduncle) 15 to 20 cm. long, much shorter than leaves; petals glabrous, 5 to 5.8 mm. long; style glabrous; capsule densely fulvescent-pubescent, about 17 mm. thick.

10. **Trichilia pavoniana** C. DC. Ann. Cons. Jard. Genève **10**: 154. 1907.

Mexico, without locality.

Leaflets 13, elliptic, 2 to 5 cm. long, obtusely short-acuminate, appressed-hirtellous above, densely so beneath; panicles about equaling the leaves; calyx teeth 5, rounded, ciliolate; petals glabrous, 6 mm. long; style glabrous.

11. **Trichilia colimana** C. DC. Bot. Gaz. **19**: 40. 1894.

Trichilia langlassei[1] C. DC. Ann. Cons. Jard. Genève **10**: 160. 1907.

Sinaloa to Guerrero; type from Colima.

Shrub or tree; leaflets 9 to 13, lanceolate to ovate or obovate-oval, the larger 5 to 12 cm. long, 2 to 4.5 cm. wide, sparsely or rather densely pilosulous or pilose on both sides, acuminate; panicles much shorter than leaves or equaling them, sparsely pilosulous; calyx ciliolate; petals 4 or 5; capsules 1 to 1.5 cm. thick, pubescent with short whitish hairs; seeds subglobose, 6 mm. thick.

12. **Trichilia wawrana** C. DC. in DC. Monogr. Phan. **1**: 666. 1878.

Known only from the type locality, "Passo-Majo," Mexico.

Leaflets 13 to 15, lanceolate, the larger 3.5 cm. long, 1.5 cm. wide, obtusely cuspidate, appressed-pilose on both sides chiefly on the veins, ciliate; panicles half as long as the leaves; calyx puberulous; style glabrous above.

DOUBTFUL SPECIES.

TRICHILIA PALLIDA Swartz. Prodr. Veg. Ind. Occ. 67. 1788. This West Indian species is listed by Hemsley[2] from Mexico on the authority of Grisebach, but the record is very doubtful.

TRICHILIA PALMERI C. DC. Bot. Gaz. **19**: 39. 1894.

Known only from the type locality, Armeria, Colima.

Petioles 1 to 2 cm. long; leaflets 3, narrowly obovate or elliptic, 2.8 to 6 cm. long, 1.5 to 2.5 cm. wide, petiolulate, obtusely acuminate or short-pointed,

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[1] Named for Eugène Langlassé, who made a large collection of plants in 1898 and 1899 in the states of Michoácan and Guerrero. A set of the plants is in the U. S. National Herbarium.

[2] Biol. Centr. Amer. Bot. **1**: 183. 1879.

glabrous above, densely spreading-pilosulous on the veins beneath and sparsely so on surface; flowers unknown; capsule glabrous, about 6 mm. thick; seeds 4 mm. long.

Distinguished from *Trichilia parvifolia* C. DC., the only other Mexican species with 3-foliolate leaves, by the shape and pubescence of the leaflets.

TRICHILIA SCHIEDEANA C. DC. in DC. Monogr. Phan. 1: 664. 1878. Closely allied to *Trichilia karwinskyana* C. DC. and *T. hirta* L. No specimens have been examined, and the status of the species is uncertain. Type from Veracruz.

3. GUAREA Allem.; L. Mant. Pl. 2: 150. 1771.

REFERENCE: C. De Candolle in DC. Monogr. Phan. 1: 542–579. 1878.

Leaves abruptly pinnate; panicles axillary, sometimes borne on the older wood; calyx 4 or 5-toothed, rarely 5-sepaled; petals 4 or 5; filaments connate into a denticulate tube, the sessile anthers borne inside the tube at apex; ovary 4 or 5-celled; seeds usually large, pseudo-arillate by the separable inner pericarp.

Guarea trichilioides L., a West Indian species which has been reported incorrectly from Mexico, is said to have poisonous juice, which acts as a violent emetic and purgative. The following names have been reported from Mexico for plants of the genus whose specific identity is doubtful: "Guaraguao"; "cedrillo cimarrón" (Tabasco); "trementino" (Tabasco).

Ovary more or less pubescent.
- Leaflets 1 to 3 pairs; petals 4, 6 mm. long or less; ovary 4-celled, the ovules solitary.
  - Panicles about equaling the leaves ---------- 1. G. rovirosae.
  - Panicles much shorter than the leaves.
    - Ovary densely strigose throughout; style sparsely strigose, longer than ovary ---------- 2. G. chiapensis.
    - Ovary sparsely strigose near apex; style glabrous, equaling ovary or shorter ---------- 11a. G. excelsa dubia.
- Leaflets 5 pairs or more; petals 5, 10 mm. long; ovary 5-celled, the cells 2-ovulate ---------- 3. G. chichon.

Ovary glabrous.
- Panicles about equaling the leaves or longer.
  - Panicles, calyx, and petals glabrous ---------- 4. G. filiformis.
  - Panicles, calyx, and petals more or less densely strigillose.
    - Petals 6 mm. long; style about 2.5 mm. long, slender, distinctly longer than the ovary ---------- 5. G. tuerckheimi.
    - Petals 3.8 to 4 mm. long; style 1 mm. long or less, equaling or shorter than the ovary.
      - Panicles nearly glabrous; leaflets of the larger leaves lance-elliptic, acuminate to an obtuse apex, 4 times as long as wide or more. 6. G. polyantha.
      - Panicles rather densely strigillose; leaflets of the larger leaves oblong-obovate, obtusely short-pointed, less than 3 times as long as wide. 7. G. heterophylla.
- Panicles much shorter than the leaves.
  - Petals glabrous; petioles 6 cm. long ---------- 8. G. brachystachya.
  - Petals puberulous or ciliolate; petioles 1.8 to 4.3 cm. long.
    - Petals 8.5 mm. long ---------- 9. G. obtusata.
    - Petals 3 to 4.7 mm. long.
      - Petals merely ciliolate ---------- 10. G. makrinii.
      - Petals strigillose or pilosulous outside.
        - Gynophore glabrous ---------- 11. G. excelsa.
        - Gynophore puberulous ---------- 12. G. virescens.

1. **Guarea rovirosae** C. DC. Ann. Cons. Jard. Genève **10**: 145. 1907.
Known only from the type locality, near Atasta, Tabasco.
Leaflets lance-elliptic, 11 cm. long, acuminate; ovary sparsely pilosulous, 4-celled, the cells 1-ovulate; petals 4, pilosulous, 6 mm. long; style glabrous.

2. **Guarea chiapensis** Blake, Proc. Biol. Soc. Washington **34**: 116. 1921.
Known only from the type locality, Finca Irlanda, Chiapas.
Leaflets 2 or 3 pairs, elliptic or obovate-elliptic, 10 to 16 cm. long, short-pointed, sparsely strigillose on the veins beneath, not tufted in the axils; panicles 5 cm. long; petals densely strigillose, 5.8 mm. long.

3. **Guarea chichon** C. DC. Ann. Cons. Jard. Genève **10**: 147. 1907.
Known only from the type locality, near Atasta, Tabasco.
Leaflets oblong-elliptic, up to 23 cm. long, very short-attenuate; panicles about equaling the leaves; ovary and style densely hirsute. "Chichón de montaña."

4. **Guarea filiformis** C. DC. in DC. Monogr. Phan. **1**: 566. 1878.
Guarea filiformis β pallida C. DC. in DC. Monogr. Phan. **1**: 566. 1878.
Guarea filiformis γ cinerascens C. DC. in DC. Monogr. Phan. **1**: 567. 1878.
Morelos and Oaxaca. Nicaragua and Peru; type from Peru.
Leaflets 3 pairs, oblong-elliptic or ovate-elliptic, 13.5 cm. long, 5 cm. wide, obtusely cuspidate, glabrous; calyx teeth obtuse; petals 4 mm. long.

5. **Guarea tuerckheimi** C. DC.; Donn. Smith, Bot. Gaz. **33**: 250. 1902.
Veracruz. Guatemala; type from Cubilquitz.
Leaflets 2 to 8 pairs, obovate-oblong or oval-oblong, the larger 15 cm. long, short-acuminate with obtuse apex; panicles loose, broad, 9.5 to 25 cm. long; petals sparsely strigillose above.

6. **Guerea polyantha** Blake, Proc. Biol. Soc. Washington **34**: 117. 1921.
Known only from the type locality, Acapulco, Guerrero.
Large shrub; leaflets 2 to 5 pairs, those of the larger leaves 12.5 to 19 cm. long, 3 to 4.7 cm. wide, acuminate to an obtuse apex; panicles much branched, 10 to 24 cm. long; petals nearly glabrous, 3.8 mm. long; flowers with odor of honey. "Cedrillo."

7. **Guarea heterophylla** Blake, Proc. Biol. Soc. Washington **34**: 116. 1921.
Known only from the type locality, Pinotepa, Oaxaca.
Leaflets 1 to 5 pairs, those of the larger leaves 9 to 12.5 cm. long, 3.8 to 5 cm. wide, obscurely and obtusely short-pointed; panicles remotely branched, 7.5 to 14 cm. long; petals strigillose above, 4 mm. long.

8. **Guarea brachystachya** DC. Prodr. **1**: 624. 1824.
Mexico (?).
Leaflets ovate, subacuminate, 9 cm. long or less; panicles spiciform, about 6 cm. long; calyx teeth 4, obtuse; petals 4.

9. **Guarea obtusata** Blake, Proc. Biol. Soc. Washington **33**: 118. 1920.
Known only from the type locality, Cafetal Concordia, Cerro Espino, Oaxaca.
Leaflets 2 to 4 pairs, elliptic-oblong or obovate-oblong, 9 to 17 cm. long, broadly rounded at apex, barbate beneath in the axils; panicles about 4 cm. long; flowers very fragrant; petals 4 or 5, papillose-puberulous outside; ovary 4-celled, the ovules solitary; fruit subglobose, 2.7 cm. long; seeds 1.5 cm. long.

10. **Guarea makrinii** Blake, Contr. Gray Herb. n. ser. **53**: 57. 1918.
Known only from the type locality, Cafetal Concordia, Cerro Espino, Oaxaca.
Leaflets 2 or 3 pairs, oval or obovate-oval, the larger 9 to 10.5 cm. long, obtuse, barbate in the axils beneath; panicles 2.5 to 3.5 cm. long; petals 4 mm. long. "Ocotillo blanco."

11. Guarea excelsa H. B. K. Nov. Gen. & Sp. **7**: 227. 1825.

Tepic to Guerrero; type collected near La Venta de Acaguisotla, between Acapulco and Zumpango, Guerrero.

Tall tree; leaflets 2 to 4 pairs, elliptic-oblong to oblong, 8 to 16 cm. long, obtuse to short-pointed; panicles 6.5 cm. long or less, narrow; petals sparsely strigillose, 4 mm. long; capsules subglobose, 1.5 cm. thick, 4-seeded.

Wrongly referred by Casimir De Candolle to *Guarea humilis* Bert., a West Indian species.

11a. Guarea excelsa dubia Blake, Proc. Biol. Soc. Washington **34**: 116. 1921.

Known only from the type locality, María Madre Island, Tepic.

Ovary sparsely strigose; capsule strigillose.

12. Guarea virescens C. DC. Ann. Cons. Jard. Genève **10**: 140. 1907.

Known only from the type locality, banks of the Río Coyaquilla, Michoacán or Guerrero.

Tree, 15 meters high; leaflets 2 or 3 pairs, elliptic to obovate-oblong, short-acuminate, 11 to 21 cm. long, 6 to 8.5 cm. wide; petals 4, acute, appressed-pilosulous; staminal tube appressed-pilosulous above; gynophore puberulous; ovary 4-celled, the cells 1-ovulate.

DOUBTFUL AND EXCLUDED SPECIES.

GUAREA GLABRESCENS (Hook. & Arn.) Blake.

Sapindus glabrescens Hook. & Arn. Bot. Beechey Voy. 281. 1836–1840.

Guarea fulva β mexicana C. DC. in DC. Monogr. Phan. **1**: 575. 1878.

Mexico.

Leaflets 2 to 4 pairs, oblong-lanceolate, about 11 cm. long, beneath subvillous over whole surface when young, in age only along the veins; inflorescence paniculate; capsule subtrigonous, scarcely lobed, about 1 cm. long, often by abortion 2-celled.

GUAREA HIRSUTA C. DC. in DC. Monogr. Phan. **1**: 578. 1878.

Described by De Candolle from "New Spain" and listed by Hemsley, but a later collection shows it to be a South American species.[1]

GUAREA PALMERI Rose; C. DC. Bot. Gaz. **19**: 39. 1894.

Colima; type from Manzanillo. Guatemala; El Salvador.

Tree, 5 meters high; leaflets 2 to 6 pairs, oblong or obovate-lanceolate, 12 cm. long, 4 cm. wide, pilose in the axils beneath; panicles racemiform; sepals 4, obtuse; ovary glabrous; capsule subglobose, 4-celled, 2 cm. long.

4. SWIETENIA Jacq. Enum. Pl. Carib. 4. 1760.

REFERENCES: Rolfe, Kew Bull. **1919**: 201–207. 1919; Blake, Journ. Washington Acad. Sci. **10**: 286–297. *f. 1, 2.* 1920.

Trees with hard and heavy, red wood; leaves abruptly pinnate or rarely odd-pinnate; flowers paniculate; calyx 5-lobed, the lobes semicircular or deltoid; petals 5, oval; staminal tube 10-toothed, the anthers borne inside the tube at apex; disk crenulate; ovary 5-celled; fruit a capsule, the seeds about 12 in each cell, with a terminal wing.

The trees of this genus are well known under the name of mahogany, and they are highly valued for their handsome, hard, heavy wood, which is much used for making fine furniture and the interior finish of houses. It should be noted, however, that not all the mahogany of commerce is derived from species of *Swietenia;* indeed, some of it is obtained from trees which have no relationship with the family Meliaceae.

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[1] See C. DC. Ann. Cons. Jard. Genève **10**: 150. 1907.

The first species of the genus to be described was *Swietenia mahagoni* Jacq., a West Indian plant which is not known to occur in Mexico, although it has often been reported from the region. All the species are closely related and presumably have similar properties.

A large amount of mahogany wood is exported from Mexico, especially from Yucatán and other coastal states (that from Yucatán is probably *S. macrophylla*). The trees grow rapidly and sometimes form extensive pure stands. The wood is used locally for furniture, for canoes, and for various other purposes.

A gum frequently exudes from the trunk. The bark is said to be bitter and to have astringent, tonic, and febrifuge properties. The juice of the young shoots has been employed in Cuba to heal wounds and to stop hemorrhages. The oil from the seeds ("pepitos de zopilote") was used by the Aztecs as a cosmetic, and is now sometimes used in making toilet soaps.

The following names are or have been in use in Mexico for species of the genus: "Caoba," "caobo" (Guerrero, Tabasco, Yucatán, Oaxaca; the word probably of Carib origin); "cóbano" (Colima, Guerrero); "zopilo-zontecomacuahuitl" (Nahuatl, "buzzard-head-tree," in allusion to the fact that the fruits with their curved stalks, when hanging on the trees resemble buzzard heads, as viewed from a short distance); "zopilote"; "tzopilotl"; "zopilocuahuitl"; "zopilotl"; "rosadillo" (Guerrero, Tabasco, Yucatán); "palo zopilote" (Oaxaca, *Conzatti*).

One of the species of *Swietenia* is described by Hernández[1] in a chapter headed "De Tzopilotlzonte Comatl, seu Capite Aurae."

Leaflets subsessile; seeds light brown.

Leaflets 5 to 9 cm. long, 0.8 to 3 cm. wide_____1. S. humilis.

Leaflets 8.5 to 14 cm. long, 3 to 5 cm. wide_____2. S. cirrhata.

Leaflets distinctly petioluled; seeds dark chestnut-brown___3. S. macrophylla.

1. **Swietenia humilis** Zucc. Abh. Akad. Muench. **2**: 355. *pl.* 7. 1835–36.

Michoacán to Chiapas; type collected near Tehuantepec, Oaxaca. Guatemala.

Tree, up to 10 meters high; leaflets 2 to 5 pairs, elliptic-lanceolate to elliptic-ovate, glabrous; petals white, 5 mm. long; capsule 15 to 20 cm. long, 10 to 12 cm. thick, umbonate at apex; seeds 6 to 9 cm. long. "Cóbano" (Guerrero, Michoacán, Oaxaca); "flor de venadillo" (Tepic); "caoba" (Chiapas); "gateado" (Oaxaca).

The seeds are said to be very poisonous. The seeds of a *Swietenia* supposed to belong to this species are sold by Indian peddlers in Tepic and used to make a tea which is taken for pains in the chest. The wood of this species is not known to be exported in any quantity.

2. **Swietenia cirrhata** Blake, Journ. Washington Acad. Sci. **10**: 292. *f. 2,b.* 1920.

Sinaloa to Oaxaca, less coastal than the preceding species; type from La Salada, Michoacán. El Salvador.

Tree, up to 15 meters high; leaflets 3 to 6 pairs, usually with a long filiform twisted cusp at apex. "Venadillo," "caoba" (Sinaloa).

The wood is much used in carpentry (Sinaloa).

3. **Swietenia macrophylla** King in Hook. Icon. Pl. **16**: *pl. 1550.* 1886.

Tabasco and Chiapas. Honduras and Guatemala, and perhaps farther south; type supposed to be from Honduras.

Tree; leaflets 3 to 5 pairs, on petiolules 1.5 to 7 mm. long, the blades elliptic to oblong, 6 to 18 cm. long, 2 to 7 cm. wide; petals 4 mm. long; capsule ovoid, 15 cm. long, 7.5 cm. thick, subacutely umbonate; seeds 7.5 to 10 cm. long. "Caoba" (Guatemala, Honduras).

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[1] Thesaurus 94. 1651.

This species, the "Honduras mahogany," is the most important in the genus commercially at the present time.

5. CEDRELA L. Syst. Nat. ed. 10. 940. 1759.

REFERENCES: C. De Candolle in DC. Monogr. Phan. 1: 735–747. 1878; Rose, Contr. U. S. Nat. Herb. 5: 189–191. 1899; C. De Candolle, Ann. Cons. Jard. Genève 10: 168. 1907.

Leaves abruptly pinnate, the leaflets entire; flowers panicled; calyx teeth 5; petals 5, connate below with the disk; ovary and stamens borne on a columnar disk longer than the ovary; stamens 5, the filaments free; ovary 5-celled, the cells 8 to 12-ovuled; fruit a 5-valved capsule; seeds with a terminal wing.

The species of Spanish cedar are widely distributed in Mexico. They are large trees with light coarse soft wood, which is widely employed for making cigar boxes. The wood is distinctive in appearance and has a characteristic odor. Large amounts of it are exported from Mexico, chiefly for making cigar boxes, and it has been employed locally for canoes, shingles, interior finish of houses, doors, sugar casks, rafters, and other purposes. The trees grow rapidly and sometimes form pure stands. The root bark is very bitter and has been employed for treating fevers and epilepsy. A decoction of the leaves is held in the mouth to relieve toothache. A resin which exudes from the trunk is used for affections of the chest. The seeds are reputed to have vermifuge properties.

The usual name for these trees in Mexico is "cedro." The following additional names are reported, but it is impossible to decide to what species they belong: "Kuché," "kulché" (Yucatán, Maya); "cedro colorado" (Oaxaca, Veracruz); "cedro chino"; "cedro liso"; "cedro macho" (Oaxaca); "cedro de la Habana"; "calicedra"; "cedro fino" (Veracruz, Oaxaca); "cedro oloroso" (Oaxaca); "cobano" (Oaxaca); "cedro hembra."

Cedrela odorata L., a West Indian species, has been reported frequently from Mexico, but is not known to occur in the region. It is to this species that Oviedo (Lib. IX, Cap. VII) refers, in what is probably the first account of Spanish cedar: "In Hispaniola and other islands and on the mainland there are certain trees which, because they have a pleasant odor, the Christians call *cedro;* in truth I do not believe they are cedars, but because the wood has a better odor than that of other trees, our carpenters have given it this name. It is an easily worked wood, good for making chests and door and window trimmings and for other purposes, and it is a wood not much attacked by worms; for this reason some say that it is never attacked by worms, but they are much mistaken, for it has often been proved that it does suffer in this respect like other woods; although to the tongue it seems more bitter than other woods, the taste of a worm and that of a man are not the same thing."

Leaflets broadly oval to suborbicular, broadly rounded or obtuse at apex, nearly as broad as long ---------- **1. C. rotunda.**
Leaflets lanceolate to oblong, acuminate or acute, much longer than broad.
  Petiolules 4 mm. long or less.
    Leaflets very densely and finely canescent-pilosulous beneath, glabrous above; corolla 8 to 9 mm. long; anthers not apiculate ---- **2. C. discolor.**
    Leaflets sparsely or rather densely cinereous-pilosulous or green beneath, at least the costa puberulous above; corollas 5 to 6 mm. long; anthers minutely apiculate.
      Leaves sparsely pilosulous beneath, chiefly on the primary and secondary veins; capsule 2.2 to 2.5 cm. long ---------- **3. C. saxatilis.**
      Leaves rather densely pilosulous beneath, on the surface as well as the veins; capsule 3.5 to 4 cm. long ---------- **4. C. oaxacensis.**

Petiolules 5 to 15 mm. long.
Sepals obtuse; rachis and both sides of leaflets glabrous. 5. C. angustifolia.
Sepals acute or acutish; rachis and lower surface of leaflets usually puberulous or pilosulous.
Leaflets conspicuously ciliolate.
Capsule 2.5 cm. long; leaflets acute at base 6. C. dugesii.
Capsule 4 to 4.8 cm. long; leaflets mostly broadly rounded or subcordate at base 7. C. ciliolata.
Leaflets obscurely or not at all ciliolate.
Anthers apiculate. Petals 8 mm. long 8. C. mexicana.
Anthers not apiculate.
Petals 6 mm. long; filaments glabrous 9. C. occidentalis.
Petals 8 to 9 mm. long; filaments sparsely pilose 10. C. yucatana.

1. **Cedrela rotunda** Blake, Proc. Biol. Soc. Washington **33**: 109. 1920.

Known only from the type locality, vicinity of Villa Unión, Sinaloa.

Leaflets 2 to 4 pairs, 4 to 11 cm. long, 4.5 to 9 cm. wide, papery, glabrescent above, densely and softly griseous-pilosulous beneath; petiolules 3 to 4 mm. long; capsules 2.2 to 2.5 cm. long.

2. **Cedrela discolor** Blake, Proc. Biol. Soc. Washington **33**: 108. 1920.

Known only from the type locality, San Ramón, Durango.

Leaflets 8 pairs, ovate to oblong or elliptic-oblong, the larger 13 to 17 cm. long, 3.5 to 4.3 cm. wide, shining above; panicles large, densely flowered, the flowers subsessile rufidulous-pilosulous.

3. **Cedrela saxatilis** Rose, Contr. U. S. Nat. Herb. **8**: 314. 1905.

Morelos and Oaxaca; type collected near Cuernavaca, Morelos.

Tree, 7 meters high; leaflets 5 to 8 pairs, oblong or ovate-oblong, the larger 15 cm. long, 5 to 6.3 cm. wide; panicles large, with spreading or deflexed branches.

4. **Cedrela oaxacensis** C. DC. & Rose, Contr. U. S. Nat. Herb. **5**: 190. 1899.

Cedrela montana var. *mexicana* C. DC. in DC. Monogr. Phan. **1**: 741, 1878.

Oaxaca.

Small tree; leaflets 6 or 7 pairs, oblong, 5 to 11 cm. long. 3 to 4.3 cm. wide; panicles large, with spreading or deflexed branches; capsules 3.5 to 4 cm. long.

5. **Cedrela angustifolia** DC. Prodr. **1**: 624. 1824.

Mexico, without definite locality. Reported also from Peru, but this record is very doubtful.

Leaflets 8 to 10 pairs, long-petiolulate, narrowly ovate-oblong, 11.5 cm. long, 2.8 cm. wide, glabrous on both sides, acute at base; panicles large; flowers subsessile; calyx teeth obtuse.

6. **Cedrela dugesii** S. Wats. Proc. Amer. Acad. **18**: 190. 1883.

Guanajuato; type from Guanajuato.

Large tree; leaflets 3 to 5 pairs, ovate or lance-ovate, the larger 9 to 13.5 cm. long, 2.5 to 4.8 cm. wide, caudate-attenuate, sparsely pilosulous or glabrescent and gland-dotted beneath; petiolules 7 to 15 mm. long; panicles dense; corolla 7 mm. long. "Nogal cimarrón," "cedro."

7. **Cedrela ciliolata** Blake, Proc. Biol. Soc. Washington **34**: 115. 1921.

Known only from the type locality, Rincón, near Morelia, Michoacán.

Leaflets 3 to 5 pairs, ovate or oblong-ovate, the larger 9 to 12.5 cm. long, 3.3 to 5 cm. wide, caudate-acuminate, pilosulous on the veins beneath or glabrescent; petiolules 9 to 15 mm. long. "Nogal corriente."

8. Cedrela mexicana M. Roemer, Fam. Nat. Syn. **1**: 137. 1846.

Cedrela glaziovii C. DC. in Mart. Fl. Bras. **11**[1]: 224. *pl. 65. f. 1.* 1878.

Puebla and Tepic; type from Papantla, Veracruz. Ranging southward to Brazil.

Tree; leaflets about 8 pairs, ovate-oblong or oblong, 8 to 11 cm. long, 3 to 3.5 cm. wide, somewhat puberulent beneath or glabrate; petiolules 5 to 11 mm. long; flowers 8 mm. long; capsules 2.5 to 4 cm. long. "Cedro" (Veracruz).

9. Cedrela occidentalis C. DC. & Rose, Contr. U. S. Nat. Herb **5**: 190. 1899.

Sinaloa to Oaxaca; type from Acaponeta, Tepic.

Tree, up to 20 meters high; leaflets 6 to 20 pairs, oblong, the larger 9 to 17 cm. long, 4 to 5 cm. wide, densely puberulous or glabrate beneath; petioles mostly 7 to 10 mm. long; capsule 2.5 to 4 cm. long. "Cedro" (Sinaloa).

10. Cedrela yucatana Blake, Proc. Biol. Soc. Washington **33**: 110. 1920.

Veracruz to Yucatán; type from Mérida, Yucatán.

Tree, about 12 meters high; leaflets usually 6 to 8 pairs, ovate to lance-oblong, the larger 6.5 to 13 cm. long, 2 to 4 cm. wide, incurved-puberulous beneath on whole surface or only on the veins; petiolules 5 to 10 mm. long; capsule 3.5 cm. long.

DOUBTFUL SPECIES.

CEDRELA ALTERNIFOLIA (Mill.) Steud. Nom. Bot. ed. 1. 170. 1821. *Cedrus alternifolia* Mill. Gard. Dict. ed. 8. *Cedrus* no. 3. 1768. Said to have simple cordate leaves, and probably not a member of the family. Described from Campeche.

74. MALPIGHIACEAE. Malpighia Family.

REFERENCE: Small, N. Amer. Fl. **25**: 117–171. 1910.

Shrubs or trees, often scandent; leaves usually opposite, stipulate, entire, dentate, or lobate, often with glands on the margin or lower surface; flowers usually perfect and showy, variously arranged, cleistogamous flowers often present; sepals 5, usually glanduliferous; petals 5, clawed; stamens 5 or 10; fruit drupaceous, nutlike, capsular, or of 1 to 3 samaras.

Fruit a capsule or drupe, never bristly; receptacle flat or depressed.
- Fruit dry, separating into 3 carpels ---- 4. **THRYALLIS.**
- Fruit a fleshy drupe, not separating.
  - Styles with slender acute tips ---- 1. **BYRSONIMA.**
  - Styles with thickened, obtuse or truncate tips.
    - Styles distinct ---- 2. **MALPIGHIA.**
    - Styles united ---- 3. **BUNCHOSIA.**

Fruit of winged samaras or nutlike, or densely bristly; receptacle usually pyramidal.
- Fruit densely bristly.
  - Filaments glabrous; stigma bilobate ---- 5. **LASIOCARPUS.**
  - Filaments pubescent; stigma entire ---- 6. **ECHINOPTERYS.**
- Fruit not bristly, usually of samaras, sometimes nutlike.
  - Samaras with lateral wings, these distinct or united.
    - Anther-bearing stamens 3 or 5.
      - Normal flowers with 5 fertile stamens and styles ---- 7. **ROSANTHUS.**
      - Normal flowers with 5 fertile stamens and 1 style, or with 3 fertile stamens and 2 or 3 styles ---- 8. **GAUDICHAUDIA.**
    - Anther-bearing stamens 10.
      - Lateral samara wings lobed to the base ---- 9. **TETRAPTERIS.**
      - Lateral wings not lobed.
        - Stipules borne on the petiole above the base ---- 10. **HIRAEA.**
        - Stipules borne at the base of the petiole ---- 11. **MASCAGNIA.**

Samaras with a single dorsal wing, this sometimes reduced to a keel or beak.
Style 1; stamens 5 or 6.
Samaras winged ..... 12. **JANUSIA.**
Samaras merely keeled, nutlike ..... 13. **ASPICARPA.**
Styles 3; stamens 10.
Stigmas clavate or truncate ..... 14. **BANISTERIOPSIS.**
Stigmas borne on the dilated thin style tips.
Samara wings thickened along the dorsal (outer) edge 15. **BANISTERIA.**
Samara wings thickened along the ventral (inner) edge. 16. **STIGMAPHYLLON.**

1. **BYRSONIMA** L. Rich.; Juss. Ann. Mus. Paris **18**: 481. 1811.

Byrsonima spicata (Cav.) DC. is reported from Mexico by Small, but the writer has seen no specimens referable to it.

1. **Byrsonima crassifolia** (L.) DC. Prodr. **1**: 579. 1824.
Malpighia crassifolia L. Sp. Pl. 126. 1753.
Byrsonima cotinifolia H. B. K. Nov. Gen. & Sp. **5**: 152. *pl. 447*. 1822.
Byrsonima oaxacana Juss. Ann. Sci. Nat. II. **13**: 332. 1840.
Byrsonima karwinskiana Juss. Ann. Sci. Nat. II **13**: 333. 1840.

Sinaloa to Chiapas and Veracruz. Central America, West Indies, and northern South America.

Erect shrub or tree, 2 to 9 meters high; leaves oblong to ovate or rounded-elliptic, mostly 4 to 15 cm. long, short-petiolate, acute to rounded at apex, densely tomentose when young with reddish or whitish hairs, often glabrate in age; flowers yellow or reddish; fruit a yellow drupe, about 1 cm. in diameter. Most generally known as "nance," "nanche," or "nanchi"; "chi" (Yucatán, Maya); "nananche" (*Alcocer*); "nanche de perro," "nanzinquahuitl" (*Ramírez*); "changugo" (Michoacán, Guerrero); "nantzinxocotl" (*Urbina*); "nance agrio" (Guerrero, Tabasco); "nancite" (Costa Rica, El Salvador, Nicaragua); "nance verde" (El Salvador); "yuco," "nancí," "chaparro," "peralejo" (Columbia).

Small recognized *B. oaxacana* and *B. karwinskiana* as distinct species, but the characters by which they are supposed to be distinguishable seem not to hold in the material examined by the writer.

The plant is much cultivated in Mexico and Central America for its acid edible fruit. This is usually eaten raw, but is sometimes cooked, and is used also for preparing a beverage similar to lemonade. In some localities it has been fermented to produce an alcoholic drink. The wood, which is said to be reddish and to have a specific gravity of about 0.67, is employed in various ways. The bark is used for tanning and dyeing, and is said, in addition, to yield a strong fiber. The plant is astringent, and various parts have been used in domestic medicine for fevers, colds, and snake bites.

2. **MALPIGHIA** L. Sp. Pl. 425. 1753.

Erect shrubs or small trees; leaves opposite, entire in the Mexican species, flowers in short axillary cymes; calyx with 6 to 10 glands; petals variously dentate; fruit a drupe, usually red.

Malpighia urens L., a West Indian species, has been reported from Mexico, probably erroneously. The following vernacular names are reported for it, but it is not certain that they apply even to a plant of this genus: "Ahualtzocotl," "ahualzocotlque," "palo bronco."

Leaves and branchlets tomentose, at least when young.
  Leaves cordate at base ..... 1. M. cordata.
  Leaves rounded to acute at base.
    Cymes pedunculate; leaves conspicuously petiolate ..... 2. M. mexicana.
    Cymes and leaves sessile or nearly so ..... 3. M. subglabrata.
Leaves and branchlets sericeous, strigose, or glabrous.
  Styles unequal, the 2 posterior ones longer and thicker than the anterior one.
    Leaves acute or acuminate; stamens opposite the lateral petals much stouter than the others and longer than those opposite the sepals. 4. M. incana.
    Leaves rounded or obtuse at apex; stamens opposite the lateral petals not longer than those opposite the sepals.
      Fruit 5 to 6 mm. wide ..... 5. M. umbellata.
      Fruit 10 to 12 mm. wide ..... 6. M. punicifolia.
  Styles nearly equal, or the anterior one slightly longer than the posterior ones.
    Leaves, at least most of them, obtuse or rounded at apex.
      Styles unequal, the anterior one longer than the posterior one; anterior petals longer than the posterior one ..... 7. M. heterophylla.
      Styles subequal; anterior petals smaller than the posterior one.
        Larger petals 6 to 7 mm. long ..... 8. M. galeottiana.
        Larger petals 9 to 10 mm. long ..... 9. M. diversifolia.
    Leaves acute or acuminate.
      Sepals barbate; calyx with 10 glands ..... 10. M. ovata.
      Sepals not barbate; calyx with 6 to 8 glands ..... 11. M. glabra.

1. **Malpighia cordata** Small, N. Amer. Fl. **25**: 154. 1910.
Jalisco and Morelos; type from Zacoalco, Jalisco.
Shrub, densely tomentose; leaves rounded-ovate, 3 to 6 cm. long, obtuse or acute; larger petals 9 to 11 mm. long; fruit about 1 cm. in diameter.

2. **Malpighia mexicana** Juss. Ann. Sci. Nat. II. **13**: 337. 1840.
Bunchosia guadalajarensis S. Wats. Proc. Amer. Acad. **22**: 401. 1887.
Malpighia oaxacana Niedenzu; Loesener, Bull. Herb. Boiss. **2**: 544. 1894.
Durango to Oaxaca and Morelos.
Erect shrub, 2 to 4.5 meters high; leaves oval to ovate, 3 to 10 cm. long, obtuse or acute, usually densely tomentose beneath; flowers purple or purplish, 1.5 to 2 cm. wide; fruit red, about 1 cm. in diameter. "Nanche" (Oaxaca); "manzanito" (Jalisco).

3. **Malpighia subglabrata** (Niedenzu) Small, N. Amer. Fl. **25**: 154. 1910.
Malpighia mexicana subglabrata Niedenzu, Gen. Malp. 4. 1889.
Known only from the type locality, San Agustín.
Leaves ovate, 2.5 to 7 cm. long, obtuse, glabrate; fruit red, 1 cm. long.

4. **Malpighia incana** Mill. Gard. Dict. ed. 8. *Malpighia* no. 3. 1768.
Malpighia campechiensis Lam. Encycl. **4**: 333. 1797.
Yucatán and Campeche; type from Campeche. Cuba.
Leaves oblong or lanceolate, 3 to 6 cm. long, pubescent, especially beneath, short-petiolate; flowers purple, 1.5 cm. wide; fruit 8 mm. in diameter.

5. **Malpighia umbellata** Rose, Contr. U. S. Nat. Herb. **1**: 310. 1895.
Sonora and Sinaloa; type from Agiabampo, Sonora.
Much-branched shrub, 2.5 meters high; leaves oblong or obovate, 1.5 to 3.5 cm. long, glabrate; fruit red, edible. "Mora de campo."

6. **Malpighia punicifolia** L. Sp. Pl. ed. 2. 609. 1762.

Yucatán. West Indies and northern South America.

Leaves oblong to oval, 1.5 to 7 cm. long, glabrous in age, short-petiolate; flowers pink or violet, 1.5 to 2 cm. broad; fruit red. "Cerezo," "cerezero" (Cuba).

The fruit is edible and has an agreeable flavor. In the West Indies it is much eaten, and is used for jellies and tarts. The bark is reported to yield a red dye.

7. **Malpighia heterophylla** Griseb. Linnaea **22**: 2. 1849.

Described from Mexico, the locality not known but probably in Veracruz.

Leaves ovate-lanceolate, 4 to 10 cm. long, glabrate; corolla 1.5 cm. wide.

8. **Malpighia galeottiana** Juss. Arch. Mus. Hist. Nat. (Paris) **3**: 261. 1844.

Puebla and Oaxaca; reported from San Luis Potosí; type from mountains of Oaxaca.

Shrub or tree, 1 to 6 meters high; leaves oval, oblong, or ovate, 1 to 3 cm. long, short-petiolate, bright green, glabrate; flowers pink or white, 1.5 cm. wide; fruit red, 1 cm. in diameter.

9. **Malpighia diversifolia** T. S. Brandeg. Zoe **5**: 104. 1901.

Southern Baja California; type from San José del Cabo.

Shrub, 2 to 2.5 meters high; leaves suborbicular to ovate or obovate, 2 to 4 cm. long, glabrate in age; flowers pink, 2 cm. wide; fruit red, 1 cm. in diameter, edible. "Manzana," "manzanita."

10. **Malpighia ovata** Rose, Contr. U. S. Nat. Herb. **1**: 310. 1895.

Bunchosia parvifolia S. Wats. Proc. Amer. Acad. **24**: 42. 1889. Not *Malpighia parvifolia* Juss. 1844.

Malpighia watsoni Rose, Contr. U. S. Nat. Herb. **1**: 310. 1895.

Sonora to Oaxaca; type from Guaymas, Sonora.

Shrub, 2 to 4 meters high; leaves ovate or broadly ovate, 1 to 6 cm. long, glabrate; flowers pink, 1 to 1.3 cm. wide; fruit red, 8 to 9 mm. long.

11. **Malpighia glabra** L. Sp. Pl. 425. 1753.

Nuevo León and Tamaulipas to Tabasco and Yucatán. Southern Texas, Central America, West Indies, and northern South America; type from Jamaica.

Shrub, 1 to 3 meters high; leaves mostly ovate, 2.5 to 9 cm. long, glabrous or nearly so, bright green; flowers pink, 1.5 cm. wide; fruit red. "Escobillo" (Tabasco); "manzanita" (Tamaulipas); "cereza" (*Sessé & Mociño*); "chi" (Yucatán, *Dondé*); "cerezo," "cerezo de Jamaica," "palo de gallina" (Cuba); "Júpiter" (Costa Rica); "cerezo de Castilla" (Panama); "arrayancito" (Colombia); "xocot," "xochtotl" (Nicaragua).

The fruit is edible, and the plant is sometimes cultivated. The bark is said to be astringent and to have been used as a remedy for fevers.

3. BUNCHOSIA L. Rich.; Juss. Ann. Mus. Hist. Nat. 18: 481 1811.

Erect shrubs or trees; leaves opposite, entire, usually short-petiolate; flowers mostly yellow, in narrow panicles; calyx with 8 or 10 glands; petals undulate or dentate; fruit a drupe.

Ovary and young fruit glabrous or practically so.

Leaves acute at base, glabrous; fruit 9 to 13 mm. in diameter. 1. **B. glandulosa.**

Leaves rounded or obtuse at base, pubescent beneath, at least when young; fruit 15 to 20 mm. in diameter ..... 2. **B. palmeri.**

Ovary and young fruit copiously pubescent.
  Corolla large, 18 mm. broad or larger.
    Inner petal cordate, similar to the other petals----------3. B. strigosa.
    Inner petal spatulate----------4. B. sonorensis.
  Corolla small, usually 12 to 15 mm. broad.
    Anther connective purple or brown----------5. B. lindeniana.
    Anther connective yellow.
      Leaves densely pubescent beneath when mature.
        Leaves soon glabrate on the upper surface----------6. B. biocellata.
        Leaves permanently and densely pubescent on the upper surface. 7. B. montana.
      Leaves nearly or quite glabrous when mature.
        Innermost petal with a broad suborbicular blade----8. B. lanceolata.
        Innermost petal with a spatulate blade----------9. B. gracilis.

1. Bunchosia glandulosa (Cav.) DC. Prodr. 581. 1824.
Malpighia glandulosa Cav. Monad. Diss. 411. 1789.
Yucatán. West Indies.
Shrub or small tree, 2 to 6 meters high; leaves oblong, elliptic, or ovate, 3 to 10 cm. long, usually acute, glabrous, bright green; flowers yellow; fruit bilobate, 9 to 13 mm. in diameter, red or orange. "Sipché" (Yucatán, Maya); "cabra hedionda" (Santo Domingo).

2. Bunchosia palmeri S. Wats. Proc. Amer. Acad **22**: 401. 1887.
Sinaloa to Guerrero and Morelos; type from Tequila, Jalisco.
Shrub or small tree; leaves mostly oval, 8 to 17 cm. long, obtuse or rounded and short-acuminate, pale green. "Garbancillo" (Sinaloa).

3. Bunchosia strigosa Schlecht. Linnaea **10**: 242. 1836.
Type from Tehuantepec, Oaxaca; no material seen by the writer.
Leaves ovate-oblong or elliptic-oblong, 5 to 10 cm. long, obtuse or acute, glabrate beneath.

4. Bunchosia sonorensis Rose, Contr. U. S. Nat. Herb. **1**: 94. 1891.
Dry hillsides, Sonora and Sinaloa; type from Alamos, Sonora.
Shrub, 1 to 2.5 meters high; leaves oval to oblong, 2 to 7 cm. long, obtuse or rounded at apex, copiously pubescent; flowers yellow; fruit bilobate, red, 1.5 to 2 cm. broad.

5. Bunchosia lindeniana Juss. Arch. Mus. Hist. Nat. (Paris) **3**: 335. 1844.
Veracruz.
Leaves oblong to ovate, 8 to 15 cm. long, short-acuminate, bright green, short-petiolate; fruit 2 or 3-lobate, 1 to 1.5 cm. in diameter.

6. Bunchosia biocellata Schlecht. Linnaea **10**: 241. 1836.
Bunchosia discolor Turcz. Bull. Soc. Nat. Moscou **32**[1]: 266. 1859.
Tamaulipas and Veracruz; type from Jalapa, Veracruz. Guatemala.
Shrub or small tree, 2 to 3.5 meters high; leaves mostly oval or elliptic, 5 to 13 cm. long, obtuse or acute, thin, bright green; flowers yellow.

7. Bunchosia montana Juss. Arch. Mus. Hist. Nat. (Paris) **3**: 340. 1844.
Oaxaca; type collected near the city of Oaxaca.
Shrub, 1.5 to 3 meters high; leaves mostly oblong or ovate, 3 to 7 cm. long, rounded or obtuse at apex, thick, densely pubescent; fruit bilobate, 1 to 1.5 cm. in diameter, yellow.

8. Bunchosia lanceolata Turcz. Bull. Soc. Nat. Moscou **36**[1]: 582. 1863.
Bunchosia pringlei S. Wats. Proc. Amer. Acad. **26**: 133. 1891.
Colima (?) to Oaxaca, Veracruz, and San Luis Potosí; type from Orizaba.

Slender shrub, 2 to 3 meters high, with long, often subscandent branches; leaves mostly ovate to oblong, 5 to 15 cm. long, bright green, acute or acuminate, often lustrous; flowers yellow; fruit bilobate, 1.5 to 2 cm. broad. "Capulincillo," "ciruelillo," "zapotito de San Juan" (Veracruz, according to various authors); "zapotillo de San Juan" (Oaxaca, *Reko*).

Some of the specimens referred here have no flowers, and may belong elsewhere.

9. **Bunchosia gracilis** Niedenzu, Bunchos. 5. 1898.

Described from Mexico. Central America.

Leaves elliptic or oblong, 6 to 15 cm. long, bright green, acute or acuminate.

DOUBTFUL SPECIES.

BUNCHOSIA CANESCENS (Ait.) DC. Prodr. **1**: 582. 1824. *Malpighia canescens* Ait. Hort. Kew. **2**: 105. 1789. Described from cultivated plants. Reported from Mexico by Small.

BUNCHOSIA SESSILIFOLIA DC. Prodr. **1**: 582. 1824. Described from Mexico. Probably not of this genus.

4. THRYALLIS L. Sp. Pl. ed. 2. 554. 1762.

Erect shrubs; leaves opposite, sessile or petiolate, entire; flowers usually yellow, racemose; calyx glandless or with very small glands; petals entire or dentate, persistent; fruit a small 3-lobate capsule.

Ovary glabrous.
- Leaves sessile ---------- **1. T. sessilifolia.**
- Leaves petiolate ---------- **2. T. glauca.**

Ovary pubescent.
- Sepals and leaves densely silky-strigose ---------- **3. T. vestita.**
- Sepals and leaves glabrous or nearly so.
  - Anthers about as broad as long; corolla about 1 cm. wide. **4. T. angustifolia.**
  - Anthers twice as long as broad or longer; corolla about 2 cm. wide.
    - Calyx with glands outside at base.
      - Glands at base of the leaf blade sessile ---------- **5. T. palmeri.**
      - Glands of the leaf blade long-stipitate ---------- **6. T. humilis.**
    - Calyx without glands.
      - Branches glabrous; leaf glands sessile ---------- **7. T. dasycarpa.**
      - Branches pubescent; leaf glands stipitate ---------- **8. T. tuberculata.**

1. **Thryallis sessilifolia** Rose, Contr. U. S. Nat. Herb. **12**: 281. 1909.

Galphimia sessilifolia Rose, Contr. U. S. Nat. Herb. **3**: 313. 1895.

Oaxaca; type from hills of Las Sedas, altitude 1,800 meters.

Shrub, 0.3 to 1 meter high; leaves ovate to rounded-ovate, 1.5 to 3.5 cm. long, glabrous, glaucescent; flowers yellow, tinged with red, petals about 1 cm. long.

2. **Thryallis glauca** (Cav.) Kuntze, Rev. Gen. Pl. **1**: 89. 1891.

Galphimia glauca Cav. Icon. Pl. **5**: *pl. 489*. 1799.

Galphimia gracilis Bartl. Linnaea **13**: 552. 1839.

Galphimia latifolia Bartl. Linnaea **13**: 553. 1839.

Galphimia grandiflora Bartl. Linnaea **13**: 554. 1839.

Galphimia paniculata Bartl. Linnaea **13**: 556. 1839.

Galphimia humboldtiana Bartl. Linnaea **13**: 559. 1839.

? *Galphimia multicaulis* Juss. Ann. Sci. Nat. II. **13**: 327. 1840.

Sonora to San Luis Potosí, Morelos, and Chiapas; type from Acámbaro, Guanajuato. Central America; naturalized in the West Indies.

Slender shrub, 0.5 to 4.5 meters high, glabrous or nearly so; leaves oblong, ovate, or oval, 1 to 6 cm. long, usually obtuse or rounded at apex, more or less glaucous; flowers yellow, large, in showy racemes. "Huachácata," "nachácata," "vachácata" (Michoacán); "calderona amarilla," "flor de diciembre" (Michoacán, Guerrero); "ramo de oro" (Jalisco); "palo del muerto" (Jalisco, Mexico, *Urbina*); "hierba del piojo" (San Luis Potosí); "consulita," "lluvia de oro" (Porto Rico); "hierba del venado," "palo de San Vicente" (Sinaloa); "consulitas" (Santo Domingo).

A handsome shrub, sometimes cultivated. Small recognized *T. multicaulis* (Juss.) Kuntze as a valid species, said to differ from *T. glauca* by its low habit and branched inflorescence. All the material examined by the writer appears to be conspecific. The leaves are used for healing wounds in Sinaloa.

3. **Thryallis vestita** (S. Wats.) Rose, Contr. U. S. Nat. Herb. **12**: 281. 1909.
Galphimia vestita S. Wats. Proc. Amer. Acad. **21**: 421. 1886.

Known only from the type locality, Hacienda San Miguel, southwestern Chihuahua.

Slender shrub, about 30 cm. high; leaves linear or linear-lanceolate, 1 to 3.5 cm. long; flowers yellow.

4. **Thryallis angustifolia** (Benth.) Kuntze, Rev. Gen. Pl. **1**: 89. 1891.
Galphimia angustifolia Benth. Bot. Voy. Sulph. 9. 1844.
Galphimia linifolia A. Gray, Gen. Fl. Amer. **2**: 196. 1849.

Baja California and Sonora to Tamaulipas; type from Cape San Lucas, Baja California. Western Texas.

Low slender shrub; leaves linear to oval, 1 to 4 cm. long, acute or obtuse; flowers yellow, becoming reddish.

5. **Thryallis palmeri** Rose, Contr. U. S. Nat. Herb. **12**: 281. 1909.
Galphimia glandulosa Rose, Contr. U. S. Nat. Herb. **5**: 137. 1897. Not *G. glandulosa* Cav. 1799.

Known only from the type locality, Acapulco, Guerrero.

Shrub; leaves oblong to ovate, 2.5 to 6 cm. long, obtuse or acute; flowers yellow.

6. **Thryallis humilis** Rose, Contr. U. S. Nat. Herb. **12**: 280. 1909.

Tepic; type collected between Concepción and Acaponeta.

Low shrub; leaves ovate or elliptic, 4 to 7 cm. long, obtuse or acute, glaucous beneath; flowers yellow.

7. **Thryallis dasycarpa** Small, N. Amer. Fl. **25**: 151. 1910.

Dry hillsides, Sinaloa to Michoacán; type from Rosario, Sinaloa.

Shrub, sometimes 3 meters high; leaves oblong or ovate, 1 to 9.5 cm. long; flowers yellow, becoming reddish, in long racemes.

8. **Thryallis tuberculata** Rose, Contr. U. S. Nat. Herb. **12**: 281. 1909.

Known only from the type locality, between Rosario and Colomas, Sinaloa.

Leaves oblong to lanceolate, 2.5 to 5 cm. long, obtuse or acute, short-petiolate; flowers yellow.

5. **LASIOCARPUS** Liebm. Nat. For. Kjöbenhavn Vid. Medd. **1853**: 90. 1854.

1. **Lasiocarpus salicifolius** Liebm. Nat. For. Kjöbenhavn Vid. Medd. **1853**: 91. 1854.

Puebla and Oaxaca; type from Río de las Vueltas, Oaxaca.

Shrub, 1 to 2 meters high; leaves opposite, linear-oblong to oval-oblong, 2 to 6 cm. long, sericeous, especially beneath; flowers small, white, short-racemose; fruit densely covered with very long slender purplish bristles.

6. ECHINOPTERYS Juss. Arch. Mus. Hist. Nat. (Paris) 3: 342. 1844.

Erect or scandent shrubs; leaves alternate, entire; flowers racemose, the petals dentate; fruit 3-lobate, densely birstly.

Leaves petiolate, mostly ovate, 1 to 3 cm. long; bristles of the fruit slender, densely pubescent ---------- 1. E. eglandulosa.
Leaves sessile or subsessile, linear-oblong, mostly less than 1 cm. long; bristles stout, glabrate ---------- 2. E. setosa.

1. **Echinopterys eglandulosa** (Juss.) Small, N. Amer. Fl. 25: 148. 1910.
Bunchosia eglandulosa Juss. Ann. Sci. Nat. II. 13: 325. 1840.
Echinopterys lappula Juss. Arch. Mus. Hist. Nat. (Paris) 3: 342. 1844.
Sonora to Zacatecas, Morelos, and Oaxaca.
Slender scandent shrub; leaves lanceolate to broadly ovate, 1 to 3 cm. long; flowers yellow, the petals 6 to 10 mm. long; fruit densely bristly, purplish.

2. **Echinopterys setosa** T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 182. 1911.
Known only from the type locality, Sierra de la Paila, Coahuila.
Densely branded shrub with white-strigose branchlets; leaves linear-oblong, 1 cm. long or shorter.

7. ROSANTHUS Small, N. Amer. Fl. 25: 131. 1910.

1. **Rosanthus subverticillatus** (Rose) Small, N. Amer. Fl. 25: 131. 1910.
? *Banisteria brevipes* Moc. & Sessé; DC. Prodr. 1: 591. 1824.
Gaudichaudia subverticillata Rose, Contr. U. S. Nat. Herb. 8: 49. 1903.
Durango and Jalisco; type collected between Huejuquilla and Mexquitic, Jalisco.
Erect shrub, 50 to 80 cm. high, copiously pubescent; leaves opposite or ternate, oblong, 4 to 10 cm. long, obtuse and mucronate, entire; flowers yellow, the petals 7 to 11 mm. long, denticulate; fruit of 3 samaras, these 11 to 13 mm. long.

8. GAUDICHAUDIA H. B. K. Nov. Gen. & Sp. 5: 156. 1822.

Scandent or trailing shrubs; leaves opposite, entire, petiolate; calyx with 8 or 10 glands; petals yellow, dentate; fruit of usually 3 samaras.

Samaras V-shaped, the wings distinct at apex.
Anther-bearing stamens 5 ---------- 1. G. karwinskiana.
Anther-bearing stamens 3.
Flower clusters loose; sepal glands oval ---------- 2. G. schiedeana.
Flower clusters dense; sepal glands linear ---------- 3. G. confertiflora.
Samaras orbicular or obovate, the wings extending all around the body.
Anther-bearing stamens 5.
Sepals less than 5 mm. long; corolla less than 2 cm. broad ---------- 4. G. pentandra.
Sepals over 5 mm. long; corolla more than 2 cm. broad ---------- 5. G. arnottiana.
Anther-bearing stamens 3.
Leaves sessile or nearly so, narrowed to the base ---------- 6. G. cynanchoides.
Leaves conspicuously petiolate, more or less cordate at base.
Samaras mucronate at base ---------- 7. G. mucronata.
Samaras long-caudate at base ---------- 8. G. webbiana.

1. **Gaudichaudia karwinskiana** Juss. Ann. Sci. Nat. II. 13: 252. 1840.
Described from Mexico, the locality not known; specimens from Jalisco may belong here.
Leaves oblong-ovate or obovate, about 2.5 cm. long, pubescent on both surfaces.

2. Gaudichaudia schiedeana Juss. Arch. Mus. Hist. Nat. (Paris) **3**: 591. 1844.
? *Gaudichaudia albida* Schlecht. & Cham. Linnaea **5**: 217. 1830.
Triopteris sericea Schlecht. Linnaea **10**: 243. 1836.
Gaudichaudia palmeri S. Wats. Proc. Amer. Acad. **21**: 421. 1885.
Janusia mexicana T. S. Brandeg. Zoe **5**: 203. 1905.
Sonora to Oaxaca and Veracruz; type from Malpais de Naolinco, Veracruz. Central America.
Slender sericeous shrub; leaves oblong to ovate or oval, 2 to 5 cm. long, obtuse or rounded at base; petals 9 to 12 mm. long; samaras 1.5 to 2 cm. long.

3. Gaudichaudia confertiflora Juss. Ann. Sci. Nat. II. **13**: 252. 1840.
Gaudichaudia congestiflora Juss. Arch. Mus. Hist. Nat. (Paris) **3**: 590. 1844.
Reported from Aguascalientes, and probably occurring elsewhere.
Leaves 2 to 5 cm. long; petals 6 to 7 mm. long; samaras 1 to 1.4 cm. long.

4. Gaudichaudia pentandra Juss. Ann. Sci. Nat. II. **13**: 252. 1840
Jalisco to Hidalgo and Puebla; type from Sultepec, Mexico.
Leaves lanceolate to ovate-oblong, 3 to 6 cm. long, densely pubescent; petals 6.5 to 7.5 mm. long; samaras 8 to 10 mm. long.

5. Gaudichaudia arnottiana Juss. Ann. Sci. Nat. II. **13**: 252. 1840.
Sinaloa to Jalisco and Morelos; type from Jalisco.
Leaves oblong to oval, 2 to 7 cm. long; petals 1.5 to 1.8 cm. long; samaras 1.4 to 1.8 cm. long.

6. Gaudichaudia cynanchoides H. B. K. Nov. Gen. & Sp. **5**: 158. *pl. 445*. 1822.
Type from Morelia, Michoacán.
Leaves oblong, 2 to 5 cm. long; petals 6 to 7 mm. long.
The following vernacular names have been reported, but they probably refer to other species: "Hierba del zorro," "xunequiltzio," "xunequiltl."

7. Gaudichaudia mucronata (Moc. & Sessé) Juss. Ann. Sci. Nat. II. **13**: 253. 1840.
Hiraea mucronata Moc. & Sessé; DC. Prodr. **1**: 586. 1824.
? *Hiraea oxyota* Moc. & Sessé; DC. Prodr. **1**: 586. 1824.
? *Hiraea podocarpa* Moc. & Sessé; DC. Prodr. **1**: 586. 1824.
? *Hiraea acuminata* Moc. & Sessé; DC. Prodr. **1**: 586. 1824.
Gaudichaudia filipendula Juss. Ann. Sci. Nat. II. **13**: 252. 1840.
Sonora and Chihuahua to San Luis Potosí, Veracruz, and Oaxaca; reported from Yucatán. Central America.
Leaves oblong or ovate, 3 to 8 cm. long, often auriculate at base; petals 6 to 8 mm. long; samaras 8 to 10 mm. long. "Chililo-ak" (Yucatán).

8. Gaudichaudia webbiana Juss. Ann. Sci. Nat. II. **13**: 152. 1840.
Described from Mexico, the locality not known.
Leaves oblong-ovate, 2.5 to 4.5 cm. long; petals 6 to 8 mm. long; samaras 10 to 12 mm. long.

DOUBTFUL SPECIES.

GAUDICHAUDIA MOLLIS Benth. Pl. Hartw. 6. 1839. Type from Aguascalientes.
GAUDICHAUDIA ENRICO-MARTINEZII Bárcena, Méx. Minist. Fom. Anal. **3**: 149. 1878.

9. TETRAPTERIS Cav. Monad. Diss. 433. 1790.

Scandent or reclining shrubs; leaves opposite, entire; calyx with 8 glands; petals yellow, entire or dentate; fruit of 3 samaras, each of these 4-winged.

Glands much shorter than the sepals, usually about half as long.
Leaves conspicuously petiolate, rounded to acute at base----1. **T. mexicana.**
Leaves mostly subsessile, cordate at base----------2. **T. nelsoni.**
Glands nearly or quite as long as the sepals.
Lower wings of the samara much smaller than the upper ones.
3. **T. acapulcensis.**
Lower wings almost as large as the upper ones----------4. **T. schiedeana.**

1. **Tetrapteris mexicana** Hook. & Arn. Bot. Beechey Voy. 281. 1836.
Sinaloa to Guerrero and Morelos; type from Jalisco.
Shrub, scandent to a height of 6 to 8 meters; leaves ovate or elliptic, 4 to 10 cm. long, acute or short-acuminate, glabrate; petals 9 to 11 mm. long.

2. **Tetrapteris nelsoni** Rose, Contr. U. S. Nat. Herb. **5**: 143. 1897.
Known only from the type locally, between Nopala and Mixistepec, Oaxaca.
Leaves ovate or rounded-ovate, 1 to 3.5 cm. long, acute, glabrate.

3. **Tetrapteris acapulcensis** H. B. K. Nov. Gen. & Sp. **5**: 168. 1822.
Type from Acapulco, Guerrero. Central America and Colombia.
Leaves oblong, ovate, or oval, 3 to 6 cm. long, obtuse or acutish; petals 7 to 8 mm. long.

4. **Tetrapteris schiedeana** Schlecht. & Cham. Linnaea **5**: 218. 1830.
Heteropteris yucatanensis Millsp. Field Mus. Bot. **1**: 369. 1898.
Tepic to Veracruz, Yucatán, and Chiapas; type from Jalapa, Veracruz. Central America.
Scandent to a height of 6 meters or more; leaves lanceolate to elliptic or ovate, 3 to 9 cm. long, acute or acuminate; petals 5 to 8 mm. long.

DOUBTFUL SPECIES.

TETRAPTERIS COTONEASTER (H. B. K.) Juss. Ann. Sci. Nat. II. **13**: 264. 1840. *Galphimia mollis* H. B. K. Nov. Gen. & Sp. **5**: 173. 1822. Type from Tepecoacuilco, Guerrero.

10. HIRAEA Jacq. Enum. Pl. Carib. 4. 1760.

Erect or scandent shrubs or small trees; leaves opposite, entire, thick, short-petiolate; stipules very small, borne on the petioles; petals usually yellow, undulate or dentate; fruit of 3 samaras, with large wings.

Anthers oblong; leaves acute at base----------1. **H. dipholiphylla.**
Anthers subglobose; leaves truncate or subcordate at base.
Petals merely undulate; leaves nearly glabrous beneath------2. **H. borealis.**
Petals denticulate; leaves usually copiously pubescent beneath. 3. **H. velutina.**

1. **Hiraea dipholiphylla** Small, N. Amer. Fl. **25**: 122. 1910.
Morelos and Oaxaca; type from Cuernavaca, Morelos.
Leaves oblong to elliptic, 5 to 10 cm. long, acute or acuminate, bright green, sericeous when young but soon glabrate; petals yellow, 6 to 9 mm. long; samaras 2.5 to 3.5 cm. wide.

2. **Hiraea borealis** Niedenzu, Hiraea 5. 1906.
Cozumel Island, Yucatán. Type from Ruatán Island, Honduras.
Leaves oblong-obovate, oval, or oblong, 4 to 11 cm. long, rounded at apex; petals yellow, 8 to 9 mm. long.

3. **Hiraea velutina** Niedenzu, Hiraea 6. 1906.
Sinaloa to Veracruz and Oaxaca; type from Pinotepa, Oaxaca. Southward to Colombia.
Leaves mostly obovate, 5 to 11.5 cm. long, rounded or short-pointed at apex, coriaceous, sometimes glabrate in age; petals yellow, about 9 mm. long.

11. MASCAGNIA Bertero; Colla, Hort. Ripul. 86. 1824.

Scandent, trailing, or suberect shrubs; leaves opposite, entire; calyx with usually 8 glands; petals entire, denticulate, or rarely lobate; fruit of 3 samaras with large wings.

Styles pubescent; petals yellow.
  Flowering peduncles 3 mm. long or longer; anthers ovoid--1. M.macroptera.
  Flowering peduncles 1 mm. long or less; anthers subglobose--2. M. mexicana.
Styles glabrous; petals not yellow.
  Filaments very unequal.
    Leaves broadly ovate to lanceolate, usually acute----------3. M. lilacina.
    Leaves obovate or broadly obovate, usually rounded at apex. 4. M. vacciniifolia.
  Filaments equal or nearly so.
    Flowers mostly axillary, never in terminal panicles.
      Leaves mostly oblong or ovate-oblong, 1.5 cm. long or shorter. 5. M. cana.
      Leaves broadly ovate to suborbicular, mostly 2 to 6 cm. long. 6. M. seleriana.
    Flowers in terminal panicles.
      Petals undulate; glands much shorter than the sepals; leaves glabrous or nearly so----------7. M. gouania.
      Petals denticulate; glands nearly as long as the sepals; leaves soft-pubescent on both sides----------8. M. polybotrya.

1. **Mascagnia macroptera** (Moc. & Sessé) Niedenzu, Mascagn. 27. 1908.
Hiraea macroptera Moc. & Sessé; DC. Prodr. 1: 586. 1824.
Hiraea septentrionalis Juss. Ann. Sci. Nat. II. 13: 259. 1840.
Hiraea greggii S. Wats. Proc. Amer. Acad. 17: 333. 1882.
Hiraea mexicana Rose, Contr. U. S. Nat. Herb. 1: 312. 1895.
Baja California and Sonora to Tamaulipas, Hidalgo, and Sinaloa.
Scandent or sometimes erect shrub; leaves lanceolate to oval, 3 to 8 cm. long, rounded to acute at apex, glabrate, short-petiolate; petals 6.5 to 12 mm. long; samaras 4.5 to 5.5 cm. wide, the wings erose-denticulate or undulate. "Gallinita" (Sonora, Baja California); "matanene" (Baja California, Sinaloa); "bejuco prieto" (Sinaloa).
Leaves sometimes used as poultices for bruises and sores.

2. **Mascagnia mexicana** Niedenzu, Mascagn. 29. 1908.
Veracruz; type collected near Orizaba.
Leaves ovate or oval, 10 cm. long or less, pubescent beneath; petals yellow, 10 to 12 mm. long; samaras 3.5 to 4.5 cm. wide.

3. **Mascagnia lilacina** (S. Wats.) Niedenzu in Engl. & Prantl, Pflanzenfam. 3[4]: 56. 1890.
Hiraea lilacina S. Wats. Proc. Amer. Acad. 17: 333. 1882.
Coahuila; type from Caracol Mountains, south of Monclova.
Scandent to a height of 4.5 meters; leaves 2.5 to 4 cm. long, rounded or cordate at base; petals blue or lilac, 8 to 10 mm. long; samaras 2 to 2.5 cm. wide.

4. **Mascagnia vacciniifolia** Niedenzu, Mascagn. 11. 1908.
Mascagnia rupicola T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 501. 1919.
Veracruz and perhaps elsewhere.
Scandent on rocks to a height of 15 meters; leaves 2 to 3 cm. long, obtuse or acute at base; petals rose-colored, 5 to 6 mm. long; samaras 2.5 cm. wide.

5. **Mascagnia cana** Small, N. Amer. Fl. **25**: 120. 1910.

Hiraca sericea Engelm.; A. Gray, Pl. Wright. **1**: 37. 1852. Not *H. sericea* Juss. 1832.

Mascagnia sericea Niedenzu, Mascagn. 29. 1908.

Sonora to Durango and Coahuila; type from Cadena, Durango.

Apparently an erect shrub; leaves copiously sericeous, short-petiolate or sessile; petals purplish, 5 to 6 mm. long; samaras 1.5 to 1.8 cm. wide, often purplish.

6. **Mascagnia seleriana** Loes. Bull. Herb. Boiss. **2**: 543. 1894.

Hiraea parviflora Rose, Contr. U. S. Nat. Herb. **5**: 139. 1897.

Mascagnia pringlei Niedenzu, Mascagn. 9. 1908.

Veracruz, Puebla, and Oaxaca; type from Mitla, Oaxaca.

Erect or scandent shrub; leaves densely pubescent, rounded or subcordate at base, short-petiolate; petals violet, 5 to 8 mm. long; samaras 1.3 to 2 cm. wide. "Maxocotl," "maxoctl" (Oaxaca).

7. **Mascagnia gouania** Small, N. Amer. Fl. **25**: 120. 1910.

Morelos; type from Jojutla.

Scandent shrub; leaves ovate to rounded-ovate, 4 to 7 cm. long, acute or abruptly acuminate, long-petiolate; petals purplish, 5 to 6.5 cm. long; samaras 2.5 to 3 cm. wide.

8. **Mascagnia polybotrya** (Juss.) Niedenzu in Engl. & Prantl, Pflanzenfam. **3**[4]: 56. 1890.

Hiraea polybotrya Juss. Ann. Sci. Nat. II. **13**: 260. 1840.

?Hiraea spicigera Turcz. Bull. Soc. Nat. Moscou **36**[1]: 584. 1863.

Puebla and Oaxaca.

Leaves 2.5 to 5 cm. long, rounded or subcordate at base, short-petiolate; petals blue.

No material seen by the writer; perhaps the same as *M. gouania*.

12. JANUSIA Juss. Ann. Sci. Nat. II. 13: 250. 1840.

Slender scandent shrubs; leaves small, opposite, short-petiolate, entire; flowers small, yellow, solitary or in axillary clusters, the petals undulate; fruit of 2 or 3 samaras.

Leaves linear or narrowly lanceolate ..... **1. J. gracilis.**
Leaves ovate or oval ..... **2. J. californica.**

1. **Janusia gracilis** A. Gray, Pl. Wright. **1**: 37. 1852.

Dry hillsides, Baja California to Coahuila. Western Texas to southern Arizona; type collected near El Paso, Texas.

Leaves 1 to 3 cm. long, strigose, especially beneath; larger petals 4 to 5 mm. long; samaras 9 to 12 mm. long.

2. **Janusia californica** Benth. Bot. Voy. Sulph. 8. 1844.

Dry hillsides, Baja California, Sonora, and Sinaloa; type from Magdalena Bay, Baja California.

Leaves 1.5 to 4 cm. long, rounded or obtuse at apex, thinly strigose, often subcordate at base; samaras 9 to 12 mm. long, often tinged with red.

13. ASPICARPA Rich. Mém. Mus. Hist. Nat. 2: 396. 1815.

Slender shrubs with erect or reclining stems; leaves opposite, entire, sessile or short-petiolate; flowers of two kinds, the petaliferous in mostly terminal clusters, with fimbriate petals, the cleistogamous sessile in the lower axils or on long axillary peduncles; fruit of 2 crested nutlets.

Pubescence of the stems of spreading hairs_____1. **A. hirtella.**
Pubescence of the stems of appressed hairs.
Cleistogamous flowers sessile in the axils_____2. **A. hyssopifolia.**
Cleistogamous flowers pedunculate.
Peduncles of the cleistogamous flowers nearly or quite as long as the leaves. **3. A. longipes.**
Peduncles of the cleistogamous flowers much shorter than the leaves.
Leaves 4 to 8 mm. wide, thinly strigose or glabrate beneath. **4. A. humilis.**
Leaves 10 to 30 mm. wide, densely sericeous beneath_____5. **A. lanata.**

1. **Aspicarpa hirtella** Rich. Mém. Mus. Hist. Nat. **2**: 399. 1815.
Aspicarpa urens Lag. Gen. & Sp. Nov. 1. 1816.
Acasmus pruriens Desv.; Desf. Cat. Pl. Paris. ed. 3. 233. 1829.
Zacatecas and Jalisco to Mexico.
Stems scandent or reclining, hirsute with stinging hairs; leaves oval-ovate, 1.5 to 3.5 cm. long, rounded to acutish at apex, cordate or subcordate at base; larger petals about 1 cm. long.

2. **Aspicarpa hyssopifolia** A. Gray, Bost. Journ. Nat. Hist. **6**: 167. 1850.
Western Texas, along the Rio Grande, and doubtless also in Coahuila or Nuevo León.
Stems 10 to 30 cm. high; leaves mostly linear or lanceolate, 1 to 2.5 cm. long, acute; larger petals 5 to 7 mm. long.

3. **Aspicarpa longipes** A. Gray, Pl. Wright. **1**: 37. 1852.
Sonora to San Luis Potosí and Querétaro. Western Texas and southern Arizona; type from Texas.
Stems 1 meter long or less, sometimes scandent; leaves ovate or oval, 1 to 4.5 cm. long, cordate or subcordate at base.

4. **Aspicarpa humilis** (Benth.) Juss. Arch. Mus. Hist. Nat. (Paris) **3**: 597. 1844.
Gaudichaudia humilis Benth. Pl. Hartw. 6. 1839.
Aspicarpa hartwegiana Juss. Ann. Sci. Nat. II. **13**: 253. 1840.
Chihuahua and Durango to San Luis Potosí; type from Aguascalientes.
Low ascending shrub; leaves ovate to oblong-lanceolate, 1 to 3 cm. long.

5. **Aspicarpa lanata** Rose, Contr. U. S. Nat. Herb. **8**: 49. 1903.
Durango, Jalisco, and Zacatecas; type from Guadalajara, Jalisco.
Densely pubescent shrub, 20 to 70 cm. high; leaves often whorled, oblong to oval, 3 to 6.5 cm. long, acute to rounded at apex; petals yellow, 6 to 9 mm. long.

14. BANISTERIOPSIS C. B. Robinson; Small, N. Amer. Fl. 25: 131. 1910.

Scandent shrubs; leaves opposite, entire, petiolate; flowers large, paniculate, the calyx with 8 or 10 glands, or glandless; petals dentate or lacerate; fruit of 3 or fewer samaras.

Leaves lanceolate or oblong-lanceolate, glabrous_____1. **B. acapulcensis.**
Leaves oval or broadly ovate, sericeous_____2. **B. argentea.**

1. **Banisteriopsis acapulcensis** (Rose) Small, N. Amer. Fl. **25**: 132. 1910.
Heteropteris acapulcensis Rose, Contr. U. S. Nat. Herb. **5**: 139. 1897.
Known only from the type locality, Acapulco, Guerrero.
Leaves 7 to 15 cm. long; larger petals 5 to 5.5 mm. long; samaras 2.5 to 3 cm. long.

2. **Banisteriopsis argentea** (H. B. K.) C. B. Robinson; Small, N. Amer. Fl. **25**: 133. 1910.

Heteropteris argentea H. B. K. Nov. Gen. & Sp. **5**: 164. 1822.

Chiapas. Central America and northern South America; type from Colombia.

Leaves 3 to 12 cm. long, rounded to acute at apex; petals pink, the larger ones 7 to 8 mm. long; samaras 2.5 to 3 cm. long.

15. BANISTERIA L. Sp. Pl. 427. 1753.

Erect or scandent shrubs or trees; leaves opposite, entire; flowers large, in paniculate cymes; calyx glandless or with 8 glands; petals entire or denticulate; fruit of 2 or 3 samaras.

Sepal tips recurved. Inflorescence densely reddish-pubescent__1. **B. laurifolia.**
Sepal tips erect.
  Leaves with 2 to 6 sessile glands near the base of the blade underneath. 2. **B. beecheyana.**
  Leaves with 2 stipitate glands underneath.
    Glands remote from the base of the blade.
      Body of the samara with a thin crown on the side_____3. **B. cotinifolia.**
      Body of the samara not crowned.
        Leaves acute or acuminate_____4. **B. arborescens.**
        Leaves rounded or obtuse at apex_____5. **B. pallida.**
    Glands borne at the extreme base of the leaf blade.
      Samaras 2 to 2.5 cm. long_____6. **B. palmeri.**
      Samaras 3 to 4 cm. long.
        Body with 2 or 3 crowns_____7. **B. gayana.**
        Body with a single crown, or merely tuberculate_____8. **B. portillana.**

1. **Banisteria laurifolia** L. Sp. Pl. ed. 2. 611. 1762.

Malpighia dubia Cav. Monad. Diss. 413. 1789.

Heteropteris longifolia H. B. K. Nov. Gen. & Sp. **5**: 166. 1822.

Heteropteris floribunda H. B. K. Nov. Gen. & Sp. **5**: 166. 1822.

Byrsonima stigmatophora Schlecht. Linnaea **10**: 241. 1836.

Sinaloa to Veracruz, Tabasco, and Oaxaca. Central America and West Indies; type from Jamaica.

Large scandent shrub, or sometimes a tree, up to 12 meters high; leaves lance-oblong to elliptic or ovate, 5 to 16 cm. long, obtuse to acuminate, coriaceous, lustrous, glabrous in age; flowers yellow, the petals 5 to 7 mm. long; samaras 3.5 to 4 cm. long. "Pinsanillo" (Michoacán, Guerrero); "escobillo" (Tabasco); "bejuco de caballo" (*Sessé & Mociño*); "coral" (Costa Rica); "cointura" (Panama); "bejuco de buey" (Porto Rico); "vergajo de toro" (Cuba).

2. **Banisteria beecheyana**[1] (Juss.) C. B. Robinson; Small, N. Amer. Fl. **25**: 134. 1910.

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[1] With the hope of finding in Bering Strait the expeditions under Parry and Franklin, the British Government in 1825 dispatched H. M. S. *Blossom* under the command of Capt. F. W. Beechey. This ship anchored at San Blas in Tepic in December, 1827, and remained there until February, 1828. During this time the naturalist, Lay, explored Tepic and adjoining regions, and made a collection of plants. Some of these came from Jalisco, and on the labels that name was written "Talisco," a circumstance which has caused a derivative of the latter incorrect name to be used as a specific name for some of the new species described from the collections. Plants were collected also at Acapulco and Mazatlán. Some of the naval officers, particularly Alexander Collie, assisted Lay in making the collections. The plants were reported upon by Hooker and Arnott.

Banisteria tomentosa Schlecht. Linnaea **10**: 244. 1833. Not *B. tomentosa* Desf. 1804

Heteropteris beecheyana Juss. Ann. Sci. Nat. II. **13**: 278. 1840.

Banisteria simulans Small, N. Amer. Fl. **25**: 136. 1910.

Tepic to Tamualipas, Yucatàn, and Chiapas. Central America and Colombia.

Erect or scandent shrub; leaves oblong to rounded-oval, 4 to 7 cm. long, copiously pubescent beneath; petals 4.5 to 6 mm. long; samaras 3 to 4 cm. long.

3. **Banisteria cotinifolia** (Juss.) C. B. Robinson; Small, N. Amer. Fl. **25**: 134. 1910.

Heteropteris cotinifolia Juss. Ann. Sci. Nat. II. **13**: 274. 1840.

Veracruz and Oaxaca.

Leaves broadly ovate or rounded, 4 to 7 cm. long, obtuse, glabrate; samaras 2.5 to 3 cm. long.

4. **Banisteria arborescens** (T. S. Brandeg.) Small, N. Amer. Fl. **25**: 135. 1910.

Heteropteris arborescens T. S. Brandeg. Zoe **5**: 203. 1905.

Known only from the type locality, Cerro Colorado, Sinaloa.

Leaves ovate to oblong-lanceolate, 4 to 8 cm. long, glabrate; samaras 2.5 to 3 cm. long.

5. **Banisteria pallida** (T. S. Brandeg.) Standl.

Heteropteris pallida T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 182. 1915.

Guerrero and Oaxaca; type from San Gerónimo, Oaxaca.

Leaves ovate to broadly oval, 3 to 11 cm. long, in age glabrous; samaras 2.5 to 3 cm. long.

Perhaps not distinct from *B. arborescens*.

6. **Banisteria palmeri** (Rose) C. B. Robinson; Small, N. Amer. Fl. **25**: 135. 1910.

Heteropteris palmeri Rose, Contr. U. S. Nat. Herb. **1**: 311. 1895.

Sonora and Sinaloa; type from Alamos, Sonora.

Leaves ovate or lanceolate, 3 to 7 cm. long, glabrate; larger petals 5 to 6 mm. long. "Bejuco huesillo" (Sinaloa).

The stems are used as cordage. They are sometimes 20 to 25 meters long.

7. **Banisteria gayana** (Juss.) C. B. Robinson; Small, N. Amer. Fl. **25**: 135. 1910.

Heteropteris gayana Juss. Ann. Sci. Nat. II. **13**: 274. 1840.

Colima to Oaxaca.

Large scandent shrub; leaves 2.5 to 7 cm. long, glabrate; samaras often tinged with red.

8. **Banisteria portillana** (S. Wats.) C. B. Robinson; Small, N. Amer. Fl. **25**: 135. 1910.

Heteropteris portillana S. Wats. Proc. Amer. Acad. **22**: 402. 1887.

Jalisco; type collected near Guadalajara.

Scandent shrub; leaves 6 to 11 cm. long, glabrous in age; petals 7 to 8 mm. long, salmon-colored outside, red inside.

16. STIGMAPHYLLON Juss.; St. Hil. Fl. Bras. Merid. **3**: 48. 1833.

Scandent shrubs; leaves opposite, entire, dentate, or lobate, petiolate; flowers large, yellow, in axillary pedunculate umbel-like corymbs, the petals dentate; fruit of 2 or 3 samaras.

Leaves copiously pubescent beneath, even in age_____**1. S. lindenianum.**

Leaves glabrous beneath or nearly so.

Leaves deltoid-cordate or ovate-cordate, deeply cordate at base. **2. S. selerianum.**

Leaves oval, elliptic, or ovate, rounded or subcordate at base. **3. S. mucronatum.**

1. **Stigmaphyllon lindenianum** Juss. Arch. Mus. Hist. Nat. (Paris) **3**: 362. 1844.

Stigmaphyllon lupulus S. Wats. Proc. Amer. Acad. **21**: 461. 1885.

San Luis Potosí to Yucatán and Chiapas; type from Teapa, Tabasco. Central America.

Coarse scandent shrub; leaves entire, undulate, or deeply lobate, rounded to acuminate at apex, truncate or cordate at base; larger petals 9 to 11 mm. long; samaras 2 to 2.5 cm. long. "Chinaca" (Veracruz).

2. **Stigmaphyllon selerianum** Niedenzu, Stigmatoph. **2**: 7. 1900.

Oaxaca and Chiapas; type from Almoloyas, Oaxaca.

Leaves 2 to 9 cm. long, entire or undulate, deeply cordate, with rounded sinuses, long-petiolate; petals 1.3 to 1.5 cm. long.

3. **Stigmaphyllon mucronatum** (DC.) Juss. Arch. Mus. Hist. Nat. (Paris) **3**: 377. 1844.

Banisteria mucronata DC. Prodr. **1**: 589. 1824.

Banisteria ternata Moc. & Sessé; DC. Prodr. **1**: 591. 1824.

Veracruz and Oaxaca. Central America and northern South America; type from Ecuador.

Slender scandent shrub; leaves 3 to 9 cm. long, rounded to acute at apex, pale beneath; larger petals 1.3 to 1.8 cm. long; samaras 2 to 2.5 cm. long. "Bejuco de ratón" (Guatemala, Honduras).

75. POLYGALACEAE. Milkwort Family.

(Contributed by S. F. Blake.)

Herbs, shrubs, or trees, sometimes scandent, with alternate (in all the following species) or sometimes opposite or whorled, entire leaves, without stipules or with small stipular glands; flowers perfect, zygomorphic, racemed, the racemes sometimes paniculate; sepals 5, free or the two lower united, one dorsal, two ventral, two lateral and interior, the latter (wings) usually much larger than the others and petaloid; petals 3, rarely 5, hypogynous, the ventral one (keel) boat-shaped, often with a terminal beak or crest, the two upper usually ligulate or oblong, the two lateral rarely present, always very small; stamens 8 (in all the following species), the filaments united for most of their length into a sheath split on the upper side, united at base to the upper petals or the keel or both; anthers 1-celled, opening by terminal pores; disk usually represented by a gland at base of ovary; ovary 1 or 2-celled; style 1; stigma often 2-lobed; ovules solitary, pendulous; fruit a capsule, drupe, or samara; seeds usually pubescent and arillate.

Ovary and fruit 2-celled; fruit a dehiscent capsule ---------- **1. POLYGALA.**

Ovary and fruit 1-celled; fruit indehiscent.

Keel with a plicate crest; fruit a samara, with a large wing on the lower side ---------- **2. SECURIDACA.**

Keel not crested; fruit drupelike, not winged ---------- **3. MONNINA.**

1. POLYGALA L. Sp. Pl. 701. 1753.

Herbs, shrubs, or trees, with alternate estipulate leaves and racemose flowers; sepals free or the two lower united; wings petaloid; keel crested, beaked, or unappendaged; stamens 8 or rarely 6; fruit a 2-celled 2-seeded thin-walled capsule; seeds usually pubescent and arillate.

The species are of little economic importance but some are used in medicine, diaphoretic, expectorant, and emetic properties being ascribed to them. Others are used locally as remedies for snake bites, and some are said to have poisonous properties.

Keel blunt, without crest or beak.
- Sepals all free.
  - Sepals and wings at least in part deciduous.
    - Sepals all herbaceous, deciduous like the wings, or with them rarely subpersistent; aril pubescent at least at apex.
      - Capsule and leaves not obviously glandular.
        - Leaves small, mostly 6 to 20 mm. long, usually distinctly dimorphous, the lower shorter, oval or oblong-oval, the upper oblong to linear or rarely uniform, but then smaller than in the next group ---------- **I. MICROTHRIX.**
        - Leaves comparatively large, mostly 2 to 6 cm. long, 1 to 3 cm. wide, ovate, gradually reduced upward, not noticeably dimorphous. **II. HEBANTHA.**
      - Capsule and leaves bearing large glands ---------- **III. ADENOPHORA.**
    - Sepals not all herbaceous, the lower ones petaloid, deciduous like the wings, the upper one herbaceous, persistent; aril glabrous. **IV. BILOBA.**
  - Sepals and wings persistent, the sepals herbaceous ---------- **V. HUATECA.**
  - Sepals not all free, the two lower ones connate. Wings and sepals persistent. **VI. HEBECLADA.**

Keel with a beak or crest.
- Keel with a conic or cylindric beak, not crested.
  - Sepals (except usually the upper) and wings deciduous. **VII. EURHINOTROPIS.**
  - Sepals and wings persistent ---------- **VIII. PANTOMONE.**
- Keel with a fimbriate crest ---------- **IX. MONNINOPSIS.**

I. MICROTHRIX.

Leaves nearly uniform, oval or ovate.
- Plant densely pubescent with spreading hairs.
  - Capsule merely ciliate; wings shorter than keel ---------- **1. P. ovatifolia.**
  - Capsule puberulous on the sides; wings longer than keel ---------- **2. P. buxifolia.**
- Plant puberulous with incurved or appressed hairs.
  - Wings subpersistent ---------- **3. P. myrtilloides.**
  - Wings deciduous.
    - Leaves oval or elliptic, obtuse or rounded ---------- **4. P. xanti.**
    - Leaves ovate, acuminate ---------- **5. P. serpens.**

Leaves more or less dimorphous, the lower oval or oblong, the upper longer, linear to oblong, elliptic, or ovate.
- Wings glabrous; capsule merely ciliate ---------- **6. P. pavoni.**
- Wings pubescent, at least at base, or if rarely glabrous, then capsule pubescent on the sides.
  - Aril small, the depth of the entire or merely denticulate-lobulate scarious margin less than the height of the corneous umbo.

Hairs of stem all incurved or appressed.
  Capsule more or less pubescent on sides.
    Flowers 4 to 5 mm. long----------7. **P. magdalenae.**
    Flowers 6 to 7 mm. long.
      Stems hirsute-tomentose above----------8. **P. leptosperma.**
      Stems barely puberulous above----------27. **P. oaxacana.**
  Capsule merely ciliate at maturity.
    Middle and upper leaves strongly reduced, 5 to 14 mm. long, linear or lance-linear.
      Aril with more or less distinct dorsal lobe, subpedicellate by the pointed base of seed----------9. **P. barbeyana.**
      Aril without distinct dorsal lobe, subsessile.
        Aril with subglabrous umbo----------10. **P. zacatecana.**
        Aril with densely pilose umbo----------11. **P. intricata.**
    Middle and upper leaves not reduced, 15 to 31 mm. long.
      Middle and upper leaves obovate-oblong, 4.5 to 7 mm. wide. 12. **P. palmeri.**
      Middle and upper leaves linear, 1.5 to 3 mm. wide. 13. **P. racemosa.**
Hairs of stem (at least in part) wide-spreading.
  Hairs of stem all short and wide-spreading; leaves not reticulate. 14. **P. rectipilis.**
  Hairs of stem partly long and spreading, partly short and incurved; leaves reticulate.
    Middle and upper leaves linear or linear-lanceolate, 1.8 to 4 mm. wide. 21. **P. retifolia.**
    Middle and upper leaves oblong-lanceolate or oval, 4.5 to 16 mm. wide. 22. **P. amphothrix.**
Aril larger, the depth of the lobed or lobulate scarious margin equaling or exceeding the height of the corneous umbo.
  Capsule merely ciliate at maturity; aril not veil-like.
    Upper leaves linear to narrowly lanceolate.
      Stems incurved-puberulous.
        Upper leaves strongly reduced, 5 to 14 (23) mm. long. 15. **P. reducta.**
        Upper leaves not reduced, 17 to 36 mm. long--------16. **P. longa.**
      Stems sparsely spreading-pubescent, glabrate----17. **P. neurocarpa.**
    Upper leaves ovate to elliptic-oblong.
      Wings 6 to 6.5 mm. long----------18. **P. oophylla.**
      Wings 4 to 5 mm. long.
        Scarious border of aril barely as deep as height of umbo; keel purplish----------19. **P. brachyanthema.**
        Scarious border of aril distinctly deeper than height of umbo; keel yellowish green----------20. **P. brandegeana.**
  Capsule pubescent on sides at maturity or, if merely ciliate, then aril veil-like.
    Hairs of stem (at least in part) wide-spreading.
      Middle and upper leaves linear or linear-lanceolate, 1.8 to 4 mm. wide----------21. **P. retifolia.**
      Middle and upper leaves oblong-lanceolate or oval, 4.5 to 16 mm. wide----------22. **P. amphothrix.**

Hairs of stem all incurved or appressed.
Aril veil-like, with broad scarious lobulate margin, covering one-third to three-fifths of seed, the dorsal margin vertically descending, the lower margin nearly or quite horizontal.
Sepals and wings quickly deciduous----------23. **P. obscura.**
Sepals and wings subpersistent----------24. **P. lozani.**
Aril not veil-like.
Upper leaves ovate to elliptic or lance-oblong.
Lobes of aril oblong to deltoid; wings 5 to 5.8 mm. long.
25. **P. parrasana.**
Lobes of aril linear or lance-linear; wings 3.5 to 5 mm. long.
26. **P. compacta.**
Upper leaves linear----------27. **P. oaxacana.**

II. HEBANTHA.

Capsule merely ciliate at maturity.
Hairs of stem all incurved or appressed.
Stem subterete; wings 5.5 to 6.6 mm. long.
Stem and leaves sparsely strigillose; leaves narrowly lanceolate.
28. **P. longipes.**
Stem and leaves densely strigillose or incurved-puberulous; leaves ovate to rhombic-lanceolate----------29. **P. velata.**
Stem strongly angled; wings 4.5 mm. long----------30. **P. polyedra.**
Hairs of stem (at least in part) wide-spreading.
Leaves lanceolate; wings ciliate----------31. **P. galeottii.**
Leaves ovate; wings not ciliate----------32. **P. rivinaefolia.**
Capsule pubescent on sides at maturity.
Keel 3.2 to 3.5 mm. long; wings 3.8 mm. long----------33. **P. brachytropis.**
Keel 4.2 to 6.8 mm. long; wings 4.5 to 7 mm. long.
Wings rather densely pubescent over whole outer surface.
Sepals 4 to 4.5 mm. long; capsule reticulate----------34. **P. americana.**
Sepals 2.5 to 3 mm. long; capsule scarcely reticulate--35. **P. pedicellata.**
Wings sparsely pubescent or puberulous chiefly at apex and base and along costa, or subglabrous.
Wings 6.5 to 9 mm. long.
Hairs of stem partly short and incurved, partly long and spreading.
41. **P. biformipilis.**
Hairs of stem all similar, appressed or incurved-spreading.
Capsule spreading-pilosulous; aril with minute umbo.
36. **P. cuspidulata.**
Capsule incurved-puberulous; umbo medium-sized.
37. **P. appressipilis.**
Wings 4.5 to 5.8 mm. long.
Wings suborbicular, glabrous except for the ciliolate margin and the finely puberulous costa; sepals 1 to 2 mm. long.
38. **P. brachysepala.**
Wings oval, pubescent at least along costa; sepals 2 to 3.8 mm. long.
Dorsal margin of aril strongly descending; umbo medium or large.
39. **P. microtricha.**
Dorsal margin of aril horizontal or erectish; umbo minute.
40. **P. chiapensis.**

III. ADENOPHORA.

Leaves obovate.
  Leaves incurved-pubescent ---- **42. P. glandulosa.**
  Leaves nearly glabrous ---- **43. P. phoenicistes.**
Leaves linear to oblong-lanceolate ---- **44. P. macradenia.**

IV. BILOBA.

Lower sepals glabrous; flowers purple; racemes many-flowered.
  Bracts deciduous, equaling the pedicels; stems canescent-pilosulous. **45. P. purpusii.**
  Bracts persistent, shorter than the pedicels; stems incurved-pubescent but green ---- **46. P. conzattii.**
Lower sepals ciliate; flowers greenish; racemes 1 to 4-flowered -- **47. P. parryi.**

V. HUATECA.

A single species ---- **48. P. tehuacana.**

VI. HEBECLADA.

Wings densely ciliate; seed pilose-tomentose; aril large ---- **49. P. floribunda.**
Wings very minutely glandular-ciliolate; seed pilosulous; aril minute. **50. P. apopetala.**

VII. EURHINOTROPIS.

Flowers 8.5 mm. long, purplish and yellowish ---- **51. P. fishiae.**
Flowers 4 to 5.5 mm. long, white or rosy.
  Leaves oval, glabrous or sparsely incurved-puberulous.
    Leaves 1 to 2 cm. long, 4 to 12.5 mm. wide ---- **52. P. nitida.**
    Leaves 4 to 9 mm. long, 2 to 6.5 mm. wide ---- **53. P. eucosma.**
  Leaves squamiform to lanceolate or, when broader, densely pubescent.
    Leaves not squamiform.
      Leaves, at least the lower ones, oval to suborbicular, like the stem densely spreading or incurved-spreading-pubescent. **54. P. lindheimeri.**
      Leaves mostly linear to lanceolate, merely incurved-puberulous like the stem ---- **55. P. tweedyi.**
    Leaves squamiform, 1 to 4.5 mm. long ---- **56. P. minutifolia.**

VIII. PANTOMONE.

A single species ---- **57. P. desertorum.**

IX. MONNINOPSIS.

Capsule more than twice as long as wings ---- **58. P. semialata.**
Capsule less than one and one-half times as long as wings.
  Stem glabrous ---- **59. P. hemipterocarpa.**
  Stem strigillose or puberulous.
    Wings 5 mm. long ---- **60. P. watsoni.**
    Wings 2.5 to 3.5 mm. long.
      Leaves linear or acicular; stem strigillose or incurved-puberulous.
        Capsule oblong, about twice as long as wide.
          Leaves strongly 2-sulcate beneath ---- **61. P. scoparioides.**
          Leaves not 2-sulcate beneath.
            Capsule 2 mm. long; aril 1 mm. long ---- **62. P. dolichocarpa.**
            Capsule 2.7 to 3 mm. long; aril 1.5 mm. long ---- **63. P. scoparia.**
        Capsule suborbicular or oval, not twice as long as wide. **64. P. michoacana.**
      Leaves obovate-spatulate; stems spreading-puberulous ---- **65. P. viridis.**

1. **Polygala ovatifolia** A. Gray, Pl. Wright. **1**: 39. 1852.

Chihuahua to Nuevo León. Texas and New Mexico; type from western Texas.

Suffrutescent, erect, 30 cm. high or less, densely spreading-pilose; leaves ovate, 1.2 to 3 cm. long, 0.6 to 1.3 cm. wide, acutish, spreading-pilose on both sides; racemes 2 to 6.5 cm. long; flowers greenish yellow; wings 4 to 5 mm. long; aril with rather broad, lobed and lobulate, scarious margin.

2. **Polygala buxifolia** H. B. K. Nov. Gen. & Sp. **5**: 407. 1821.

Polygala ovalifolia DC. Prodr. **1**: 331. 1824.

San Luis Potosí and Querétaro; type from Santa Rosa, Querétaro.

Suffrutescent, ascending, about 28 cm. long, spreading-pubescent; leaves elliptic or ovate, about 2 cm. long, obtuse or rounded; wings 5.5 mm. long; aril with broad scarious margin and distinct short lateral and spreading dorsal lobes.

3. **Polygala myrtilloides** Willd. Sp. Pl. **3**: 889. 1803.

San Luis Potosí and Hidalgo.

Fruticulose below, densely appressed-puberulous; leaves elliptic to oval-ovate, mostly obtuse, 1.5 to 2 cm. long, subcoriaceous, subappressed-pubescent; racemes 4 to 8-flowered; wings 5.5 to 6.5 mm. long; capsule puberulous and ciliolate; aril broadly scarious-margined, 3-lobed, the dorsal lobe short and horizontal.

4. **Polygala xanti**[1] A. Gray, Proc. Amer. Acad. **5**: 153. 1861.

Southern Baja California; type from Cape San Lucas.

Suffrutescent below, procumbent or erectish, densely incurved-pubescent; leaves oval, 6 to 16 mm. long, rounded at apex, densely incurved-pubescent; racemes short; flowers white, tinged with yellow and purple; wings 5.3 to 5.8 mm. long; capsule densely pubescent; scarious margin of aril narrow, equaling the umbo, shortly upturned at dorsal apex.

5. **Polygala serpens** Blake, Contr. Gray Herb. n. ser. **47**: 21. 1916.

Known only from the type locality, Acapulco, Guerrero.

Suffruticulose, procumbent, incurved-puberulous, 30 cm. long or less; leaves ovate, 1.5 to 2.8 cm. long, acuminate, thin, incurved-spreading-pubescent; racemes loose, 2 cm. long; flowers apparently ochroleucous; wings 5.5 to 7 mm. long; aril minute, capitelliform, with obsolete scarious margin.

6. **Polygala pavoni**[2] Chod. Mém. Soc. Phys. Hist. Nat. Genève **31**[2]: 14. 1893.

Mexico, without definite locality.

Undershrub, puberulous, about 20 cm. long; leaves elliptic or elliptic-ovate, varied, 2 cm. long, puberulous, obtuse; racemes few-flowered; flowers 5 to 6 mm. long; ovary ciliate; fruit unknown.

A species of doubtful relationship.

7. **Polygala magdalenae** T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 182. 1911.

Southern Baja California; type from Magdalena Island.

Prostrate, 30 cm. long, incurved-griseous-puberulous; lowest leaves oval-oblong, 7 mm. long, the others oblong to linear, 1.2 to 2 cm. long, incurved-

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[1] L. J. Xantus, while exployed by the U. S. Coast Survey, made a collection of about 120 species of plants in Baja California, chiefly about Cape San Lucas. Many new species were published by Gray in his report upon the collection (Proc. Amer. Acad. **5**: 153–173. 1861). A set of the plants is in the U. S. National Herbarium.

[2] In honor of José Pavón, a member of the Spanish scientific commission sent to Peru and Chile in 1777. He was an associate of Ruiz, with whom he published several classic works dealing with South American plants.

puberulous; racemes loose, 4 to 10.5 cm. long; flowers apparently ochroleucous; wings narrowly obovate-oval, 4.5 mm. long; aril minute, 0.7 mm. high, with very narrow scarious margin.

8. **Polygala leptosperma** Chod. Mém. Soc. Phys. Hist. Nat. Genève 31 [2]: 17. 1893.

Oaxaca.

Suffrutescent below, 12 cm. long, hirsute-tomentose above; leaves lanceolate to lance-linear, 1.5 to 2.2 cm. long, subtomentose-velutinous; flowers 6 to 7 mm. long; wings elliptic-lanceolate, long-ciliate; capsule ovate-cuneate, hispid; aril small, capitelliform, the very narrow scarious margin with very short upturned dorsal lobe and no lateral lobes.

9. **Polygala barbeyana** Chod. Mém. Soc. Phys. Hist. Nat. Genève 31 [2]: 16. 1893.

Coahuila to San Luis Potosí; type from San Luis Potosí. Arizona.

Several-stemmed, suffruticulose below, up to 40 cm. high, densely incurved-pubescent or at length subglabrate; leaves reduced, the lowest oblong, the middle and upper subsquamiform, linear or linear-lanceolate, 5 to 10 mm. long; racemes 1.7 to 11 cm. long; wings obovate-oval or suborbicular-oval, 3.5 to 4.5 mm. long; aril small, 0.7 mm. high, cap-shaped, subpedicellate by the pointed base of seed, with narrow unlobed scarious margin and short upturned dorsal lobe.

10. **Polygala zacatecana** Blake, Contr. Gray Herb. n. ser. 47: 26. 1916.

Known only from the type locality, near Concepción del Oro, Zacatecas.

Several-stemmed, suffruticulose below, about 12 cm. high, incurved-puberulous; leaves reduced, the lower oblong or oval, 4 to 5 mm. long, the others linear-lanceolate, 4.5 to 10 mm. long, 1 mm. wide, involute; racemes 2 to 5 cm. long; wings oval-obovate, 4 mm. long; aril tiny, very sparsely pubescent, with subglabrous umbo, the scarious margin entire, very narrow.

11. **Polygala intricata** Blake, Contr. Gray Herb. n. ser. 47: 26. 1916.

Known only from the type locality, Saltillo, Coahuila.

Stems about 10 cm. long, flexuous, ascending, densely incurved-puberulous; lowest leaves oblong, 3 mm. long, the others linear or linear-lanceolate, 11 to 14 mm. long, 1.5 to 2.5 mm. wide; racemes flexuous; wings obovate, 3.5 to 4 mm. long; aril 0.8 mm. high, the umbo densely spreading-pilose, the narrower margin subentire.

12. **Polygala palmeri** S. Wats. Proc. Amer. Acad. 17: 325. 1882.

Coahuila; type from Juárez. Western Texas.

Several-stemmed, subcanescently pubescent, about 15 cm. high; lower leaves oval, the others oblong or ovate-oblong, the middle and upper 16 mm. long, 4.5 to 7 mm. wide, obtuse or truncate, thick; racemes 4.5 cm. long; flowers greenish yellow and purplish; wings obovate, 5.7 to 6 mm. long; aril 1.5 mm. high, with narrow subentire scarious margin extended into short subhorizontal anterior and dorsal lobes.

13. **Polygala racemosa** Blake, Contr. Gray Herb. n. ser. 47: 28. 1916.

Chihuahua; type from Santa Eulalia Mountains. Southern Arizona.

Several-stemmed, fruticulous below, about 30 cm. high, densely incurved-puberulous but green; lower leaves strongly reduced, the others linear, 15 to 31 mm. long, 1.5 to 3 mm. wide, acute; racemes 7 to 13 cm. long; flowers apparently greenish; wings oval-obovate, 4.5 to 4.8 mm. long; aril 0.7 to 1 mm. high, the scarious margin lobulate, narrower than the umbo, the dorsal lobe very short, the lateral obsolete.

14. Polygala rectipilis Blake, Contr. Gray Herb. n. ser. **47**: 27. 1916.

Coahuila. Type from Hillsboro, Sierra County, New Mexico.

Several-stemmed, fruticulose below, about 20 cm. high, densely spreading-pilose with short hairs; lower leaves oblong or oval, 8 to 14 mm. long, the others linear, 12 to 22 mm. long, 1.7 to 2.5 mm. wide; racemes 4 to 10 cm. long; flowers purplish; wings obovate-oval, 4.5 mm. long; aril 1 mm. high, the scarious, scarcely lobed margin narrower than the umbo.

15. Polygala reducta Blake, Contr. Gray Herb. n. ser. **47**: 25. 1916.

Polygala scopulorum T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 364. 1917.

Coahuila to San Luis Potosí; type from San Luis Potosí.

Several-stemmed, suffruticulose below, 17 cm. high or less, incurved-puberulous; lower leaves oval-oblong, 5 to 9 mm. long, the others linear-lanceolate or linear, 5 to 23 mm. long, 0.5 to 2 mm. wide, involute; racemes very loose, 6 to 9 cm. long; wings elliptic-obovate, 4.5 to 5 mm. long; aril 1 mm. high, the dorsal lobe spreading, 1.5 mm. long, the lateral lobes short, subentire, slightly deeper than the umbo.

16. Polygala longa Blake, Contr. Gray Herb. n. ser. **47**: 29. 1916.

Chihuahua. Texas and Arizona; type from the Pecos River, Texas.

Several-stemmed, suffruticulose below, 13 to 45 cm. high, densely incurved-griseous-puberulous; lowest leaves oblong or oval-oblong, 8 to 17 mm. long, the others oblong-lanceolate or oblong-linear, 17 to 36 mm. long, 1.5 to 4 mm. wide, usually acute, griseous-puberulous; racemes 2 to 10.5 cm. long; flowers purplish; wings oval or suborbicular, 3.8 to 5.5 mm. long; aril 1 mm. high, the dorsal margin 1.5 mm. long, the umbo 0.4 mm. high, the broader scarious margin strongly lobulate, with distinct or subdistinct dorsal and shorter lateral lobes.

17. Polygala neurocarpa T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 364. 1917.

Known only from the type locality, Ixmiquilpan, Hidalgo.

Several-stemmed, suffrutescent below, about 30 cm. long, at first sparsely spreading-pubescent with short straight hairs, in age glabrate except in the axils; leaves linear to linear-oblong, 9 to 25 mm. long, 1 to 4 mm. wide, thickish, soon glabrate; racemes 3.5 to 7.5 cm. long; peduncles and pedicels glabrous; wings oval, 5.2 mm. long; aril 1 to 1.2 mm. high, 1.4 mm. long dorsally, the scarious margin repand or lobulate, descending, slightly wider than the umbo.

18. Polygala oophylla Blake, Contr. Gray Herb. n. ser. **47**: 33. 1916.

Known only from the type locality, Tlacuilotepec, Puebla.

Few-stemmed, suffruticulose below, about 20 cm. high, densely incurved-spreading-pubescent; lowest leaves elliptic, 4 mm. long, the others ovate, 11 to 22 mm. long, 3.5 to 10 mm. wide, acute or subacute; racemes 4 to 7 cm. long; flowers purplish; wings orbicular-oval, 6 to 6.5 mm. long; aril 1.6 mm. high, 2 mm. long, the broad scarious margin irregularly lobulate.

19. Polygala brachyanthema Blake, Contr. Gray Herb. n. ser. **47**: 33. 1916.

Known only from the type locality, Minas de San Rafael, San Luis Potosí.

Several-stemmed, fruticulose below, 17 to 33 cm. high, green, incurved-pubescent; lowest leaves obovate, 3 to 7 mm. long, the others oblong-elliptic, 10 to 15 mm. long, 3 to 4.8 mm. wide, subobtuse, mucronate, sparsely incurved-pubescent; flowers purplish and greenish; wings oval, 4.5 to 5 mm. long; aril 1 mm. high, 1.6 mm. long dorsally, the scarious margin irregularly crenulate-lobulate, produced into a short horizontal lobe, deeper than the umbo.

20. Polygala brandegeana Chod. Bot. Jahrb. Engler **52**: Beibl. **115**: 72. 1914.

Hidalgo and Puebla; type from El Riego, Tehuacán, Puebla.

Many-stemmed, erectish, 7 to 9 cm. high, pubescent; lower leaves obovate, 3 mm. long, the others oblong to oval or oblong-linear, 6 to 10 mm. long, 1.5 to

4.5 mm. wide, thickish, sparsely pubescent beneath; racemes very short, 1 to 3-flowered; flowers greenish and purplish; wings oval, 5.5 mm. long; aril 1.5 mm. deep, 2.3 mm. long, the broad scarious margin irregularly lobulate, with indistinct lateral and distinct dorsal lobe descending at an angle of about 45°.

21. **Polygala retifolia** Blake, Contr. Gray Herb. n. ser. **47**: 29. 1916.

Known only from the type locality, Río Blanco, Jalisco.

Stems few, fruticulose below, about 40 cm. high, densely pubescent with short incurved and long straight spreading hairs; lowest leaves 4 to 11 mm. long, the others linear or linear-lanceolate, 2.5 to 4 cm. long, 1.8 to 4 mm. wide, thick, acuminate, reticulate-venose; racemes 8 to 14 cm. long; wings obovate-oval, 5 to 6 mm. long; ovary densely pilose; fruit unknown.

22. **Polygala amphothrix** Blake, Contr. Gray Herb. n. ser. **47**: 39. 1916.

Durango and Tepic; type from Otinapa, Durango.

Stems few, 10 to 15 cm. high, densely pubescent with short incurved and long straight wide-spreading hairs; lowest leaves oval, 3.5 to 11.5 mm. long, the others oblong-lanceolate or oval, 15 to 36 mm. long, 4.5 to 16 mm. wide, obtuse or subacute, reticulate; flowers purplish; wings oval, 5 to 5.5 mm. long; ovary densely pilosulous; fruit unknown.

23. **Polygala obscura** Benth. Pl. Hartw. 58. 1840.

Polygala puberula A. Gray, Pl. Wright. **1**: 40. 1852.

Polygala laeta T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 365. 1917.

Polygala vagans T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 366. 1917.

Chihuahua to Oaxaca; type from Hacienda del Carmen, Oaxaca. Texas to Arizona.

Many-stemmed, suffruticulose below, 12 to 38 cm. high, grayish-puberulous; lower leaves oblong or oval-oblong, 12 to 28 mm. long, the middle and upper oblong to lanceolate or linear, 18 to 42 mm. long, 1.5 to 12 mm. wide, puberulous; racemes 3.3 to 9 cm. long; flowers purplish; wings oval-obovate or elliptic, 4.5 to 5.8 mm. long, 2 to 3.5 mm. wide; keel 4.8 to 5 mm. long; capsule puberulous or merely ciliate; aril 1.3 to 3 mm. high, veil-like, appressed, with very broad, irregularly lobulate, scarious margin.

23a. **Polygala obscura euryptera** Blake, Contr. Gray Herb. n. ser. **47**: 31. 1916.

Oaxaca.

Wings 6 to 6.5 mm. long, 4 to 4.5 mm. wide; keel 6 to 6.5 mm. long.

24. **Polygala lozani** Rose, Contr. U. S. Nat. Herb. **13**: 307. 1911.

Polygala calcicola Rose, Contr. U. S. Nat. Herb. **10**: 122. *pl. 37*. 1906. Not *P. calcicola* Chod. 1893.

Known only from the type locality, La Cañada, near Tehuacán, Puebla.

Several-stemmed, suffruticulose below, about 10 cm. high, subcanescent-pubescent; lower leaves oval, 11 mm. long, the others oblong or linear-oblong, 10 to 13 mm. long, 1.8 to 3.5 mm. wide, acutish, incurved-pubescent; flowers yellowish green; wings oval, 5 to 5.5 mm. long, subpersistent; aril 1.7 mm. high, the appressed scarious margin irregularly lobulate, deeper than the umbo, the dorsal lobe barely indicated.

25. **Polygala parrasana** T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 365. 1917.

Known only from the type locality, Sierra de Parrás, Coahuila.

Stems several, fructiculose below, procumbent, 4 to 10 cm. long, densely ascending-pubescent; leaves oval or elliptic-oblong, 3 to 9 mm. long, 2.5 to 4 mm. wide, apiculate to obtuse, thickish, pubescent both sides; racemes 1.3 cm. long, few-flowered; wings oval, 5.2 mm. long; keel 5.8 mm. long; aril 1.3 mm. high, 1.7 mm. long on the dorsal margin, the umbo 0.4 mm. high, the scarious mar-

gin 3-lobed, the lateral lobes ovate, vertical, appressed, the dorsal subequal, descending.

26. Polygala compacta Rose, Contr. U. S. Nat. Herb. **8**: 315. 1905.

Polygala pubescens A. Gray; Chod. Mém. Soc. Phys. Hist. Nat. Genève **31**[2]: 21. 1893. Not. *P. pubescens* Mart. 1815.

Jalisco and San Luis Potosí to Puebla; type from the Valley of Mexico.

Many-stemmed, ascending or erect, 10 to 20 cm. high, incurved-griseous-puberulous, very leafy; lower leaves obovate or oval, 5 to 17 mm. long, the others oblong or lance-oblong, 11 to 19 mm. long, 3 to 5 mm. wide, obtuse to acutish, incurved-puberulous; racemes rather dense, 1.5 to 4 cm. long; flowers apparently ochroleucous; wings oval or obovate-oval, 3.5 to 5 mm. long; aril 1 to 2 mm. high, strongly 3-lobed, the lobes scarious, linear-lanceolate or linear, descending or the dorsal more or less spreading, subequal or the dorsal somewhat the longer.

27. Polygala oaxacana Chod. Bot. Jahrb. Engler **52**: Beibl. **115**: 73. 1914.

Known only from the type locality, San Juan del Estado, Etla, Oaxaca.

Stems few, suffruticulose below, barely puberulous above, about 20 cm. long; leaves linear, the larger 26 to 35 mm. long, 3 mm. wide, acute, glabrescent; racemes 3 to 5-flowered, 3 cm. long; flowers 6 to 7 mm. long; wings oval; ovary densely pilose; fruit unknown.

28. Polygala longipes Blake, Contr. Gray Herb. n. ser. **47**: 40. 1916.

Oaxaca.

Stem slender, finely strigillose, 30 cm. high or more; leaves lanceolate, 5.5 to 6.5 cm. long, 9 to 14 mm. wide, thin, long-acuminate, sparsely and finely strigillose; racemes 14.5 cm. long or less; pedicels 5 to 8 mm. long; wings oblong-oval, 6.6 mm. long, 3.3 mm. wide; seed unknown.

29. Polygala velata Blake, Contr. Gray Herb. n. ser. **47**: 41. 1916.

Chiapas.

Erect, 35 cm. high and more, rather densely incurved-puberulous; leaves ovate to rhombic-lanceolate, 3.7 to 5.2 cm. long, 1.2 to 2.2 cm. wide, acuminate, sparsely incurved-puberulous; racemes 6.5 to 10.5 cm. long; wings oval, 5.5 mm. long, 3.5 mm. wide; aril 3 mm. high, cloaklike, the broad scarious margin sparsely pilose, appressed, slightly lobulate, the umbo medium-sized.

30. Polygala polyedra T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 364. 1917.

Known only from the type locality, Mazatlán, Sinaloa.

Stem stoutish, strongly angled, 35 cm. long and more, grayish green, densely strigillose; leaves unknown; racemes 5 cm. long or less, rather dense; wings oval, 4.5 mm. long, 3.5 mm. wide; aril 1.8 to 2 mm. high, 1.6 to 1.8 mm. long dorsally, the umbo pilose, 0.4 mm. deep, the repand-lobulate scarious margin sparsely pilose, the dorsal margin horizontal or slightly upturned.

31. Polygala galeottii Chod. Mém. Soc. Phys. Hist. Nat. Genève **31**[2]: 28. 1893.

Known only from the type locality, Rancho de Haupa, between Jalapa and Córdoba, Veracruz.

Simple or sparsely branched, slightly hirsute; leaves lanceolate, 2.8 to 4 cm. long, 1 to 1.4 cm. wide, attenuate at each end, ciliate and slightly pubescent; racemes elongate, loose; flowers 6 mm. long; wings elliptic-obovate; capsule hirsute-ciliate; aril 2 mm. high, 2.8 mm. long on the dorsal margin, papery, crenate or undulate, scarcely lobed.

32. Polygala rivinaefolia H. B. K. Nov. Gen. & Sp. **5**: 409. 1821.

Polygala albowiana Chod. Bull. Herb. Boiss. **3**: 123. 1895.

Polygala jaliscana Blake, Contr. Gray Herb. n. ser. **47**: 44. 1916.

Jalisco to Morelos; type collected near Ario, Michoacán.

Suffruticulose, several-stemmed, about 40 cm. high, rather densely pubescent with short incurved hairs and plentiful long spreading ones; leaves ovate or oblong-ovate, 2.5 to 5.5 cm. long, 1.5 to 3 cm. wide, acute to acuminate, thin, bright green above, rather densely pubescent on both sides; racemes 1.5 to 15 cm. long; flowers purplish; wings oval, 5 to 6 mm. long, 3 to 4 mm. wide; capsule suborbicular, pale, reticulate, about 1 cm. long; aril 1.5 to 2 mm. high, with lobulate or slightly lobed ventral margin, the umbo small, the dorsal margin subhorizontal or curved-ascending to nearly vertically descending.

33. **Polygala brachytropis** Blake, Contr. Gray Herb. n. ser. **47**: 46. 1916.

Known only from the type locality, Zimapán, Hidalgo.

Suffruticulose below, 25 cm. high and more, densely pubescent with short incurved and long wide-spreading hairs; leaves ovate, 2.5 to 3.8 cm. long, 1.2 to 1.4 cm. wide, acute, firm, rather sparsely pubescent; racemes about 3 cm. long; wings elliptic, 3.8 mm. long, 2.5 mm. wide; seed unknown.

34. **Polygala americana** Mill. Gard. Dict. ed. 8. *Polygala* no. 7. 1768.

Veracruz.

Several-stemmed, erect, fruticulose, 12 cm. high, densely pubescent with incurved-spreading, rather short, equal hairs; leaves ovate to obovate, 1.4 to 2.3 cm. long, 8 to 11 mm. wide, acute, firm but rather thin, rather densely pubescent on both sides; flowers purplish; racemes 1.2 to 4 cm. long; wings oval, 5 to 7 mm. long, 3 to 4 mm. wide; capsule densely spreading-pubescent, reticulate; seed unknown.

35. **Polygala pedicellata** Blake, Contr. Gray Herb. n. ser. **47**: 45. 1916.

Veracruz and Oaxaca; type from Zacuapan, Veracruz.

Stems few, fruticulose below, suberect, branched, about 40 cm. high, rather densely incurved-puberulous; leaves ovate, 2.3 to 3.4 cm. long, 9 to 16 mm. wide, subacuminate, incurved-pubescent; racemes 3.5 to 7 cm. long; flowers purplish; wings oval, 5 to 6.5 mm. long, 3.5 to 4.5 mm. wide; capsule spreading-pubescent; aril 1.5 to 1.8 mm. high, the umbo large, the subequal scarious margin with obscure lateral lobes and distinct, descending or upcurved dorsal lobe.

36. **Polygala cuspidulata** Blake, Contr. Gray Herb. n. ser. **47**: 45. 1916.

Puebla and Oaxaca; type from Cerro de Santa Lucía, near San Luis Tultitlanapa, Puebla.

Stems few, erect, densely incurved or incurved-spreading-pubescent, 15 to 40 cm. high; leaves ovate, 2 to 3 cm. long, 1.1 to 1.6 cm. wide, cuspidulate, rather densely incurved-pubescent; racemes 5 to 11 cm. long; flowers purplish; wings oval, 7 to 8.3 mm. long, 5 to 5.5 mm. wide; capsule spreading-pilosulous and ciliolate; aril 2.2 to 2.5 mm. high, with tiny pilose umbo, the undulate scarious margin sparsely pilose, the dorsal margin horizontal or slightly curved-ascending or descending at an angle of about 45°.

37. **Polygala appressipilis** Blake, Contr. Gray Herb. n. ser. **47**: 41. 1916.

Tepic to Puebla and Oaxaca; type from Cuernavaca, Morelos.

Stems several, erect, about 35 cm. high, griseous-puberulous; leaves ovate or oval, 1.5 to 3 cm. long, 8 to 13 mm. wide, acute or obtuse, appressed-puberulous; wings oval or broadly elliptic, 6.5 to 9 mm. long, 4.5 to 5.8 mm. wide; mature seed unknown.

38. **Polygala brachysepala** Blake, Contr. Gray Herb. n. ser. **47**: 44. 1916.

San Luis Potosí, Guerrero, and Morelos; type from Las Canoas, San Luis Potosí.

Stems several, fruticulose below, rather densely incurved-puberulous with a few long spreading hairs intermixed, 20 to 35 cm. high; leaves ovate, 2.8 to 4.5 cm. long, 1.2 to 2 cm. wide, acuminate, sparsely pubescent; racemes 5 to 7 cm. long; wings suborbicular, 5.5 mm. long, 4.8 mm. wide; aril cloaklike, appressed, 3.5 mm. high, with deep subentire scarious margin.

39. Polygala microtricha Blake, Contr. Gray Herb. n. ser. **47**: 46. 1916.

Hidalgo and Oaxaca; type from Zimapán, Hidalgo.

Suffruticulose below, branched, 25 cm. high and more, densely incurved-puberulous; leaves ovate, 2.7 to 3.8. cm. long, 1 to 1.2 cm. wide, acute to acuminate, firm, rather densely puberulous; racemes 3.5 to 7.5 cm. long; wings oval, 5.5 mm. long, 4 mm. wide; aril 3 mm. high, cloaklike, the large umbo pilose, the much broader scarious margin lobulate, the dorsal and lateral lobes barely indicated, subappressed.

40. Polygala chiapensis Blake, Contr. Gray Herb. n. ser. **47**: 40. 1916.

Chiapas.

Stems erect, about 24 cm. high, pubescent with short incurved and sometimes a few longer incurved-spreading hairs; lower leaves oval or obovate, the middle and upper lanceolate, 2 to 4.2 cm. long, 5 to 8 mm. wide, acuminate, sparsely incurved-pubescent, reticulate; racemes 6 to 10 cm. long; wings oval, 5.5 mm. long, 3.5 mm. wide; aril 1.5 mm. high, papery, irregularly lobulate, the horizontal dorsal margin 2.2 mm. long.

41. Polygala biformipilis Blake, Contr. Gray Herb. n. ser. **47**: 52. 1916.

Veracruz; type from Zacuapan.

Stems several, suffruticulose below, erect, 35 to 60 cm. high, densely and softly pubescent with short incurved and long straight spreading hairs; leaves ovate or oblong-ovate, 3 to 5 cm. long, 1 to 2 cm. wide. acuminate, pubescent like the stem; racemes dense, 3.5 to 7 cm. long; flowers purplish; wings oblong-oval, 8.7 mm. long, 4.7 mm. wide; aril 2.5 mm. high, the small umbo densely pilose, the broad scarious margin lobulate, the dorsal margin ascending, the anterior vertical.

42. Polygala glandulosa H. B. K. Nov. Gen. Sp. **5**: 404. 1821.

Viola punctata Humb. & Bonpl.; Roem. & Schult. Syst. Veg. **5**: 391. 1819. Not *Polygala punctata* A. W. Benn. 1879.

Polygala greggii S. Wats. Proc. Amer. Acad. **17**: 325. 1882.

Nuevo León and San Luis Potosí; type from Puente de la Madre de Dios.

Stems very numerous, suffruticulose, diffuse, 10 to 20 cm. long, densely leafy; leaves obovate to suborbicular-oval, 4.5 to 10 mm. long, 1.5 to 6 mm. wide, rounded, mucronate, cuneate at base, thick, incurved-puberulous or short-pilosulous, densely translucent-glandular-dotted; racemes axillary, 1 or 2-flowered; flowers purple; wings spatulate-obovate, 7.5 mm. long; capsule elliptic; aril galeiform, equitant.

43. Polygala phoenicistes Blake, Contr. Gray Herb. n. ser. **47**: 55. 1916.

Known only from the type locality, Sierra de Guascama, Minas de San Rafael, San Luis Potosí.

Stems several, fruticulose, diffuse or suberect, 6 to 15 cm. long; leaves cuneate-obovate, 5.5 to 7 mm. long, 2.5 to 4.5 mm. wide, densely glandular-punctate, very sparsely incurved-puberulous along costa beneath; racemes 1-flowered; flowers purple; wings spatulate-obovate, 6 mm. long; capsule oblong-elliptic; aril corneous, 3-lobed.

44. Polygala macradenia A. Gray, Pl. Wright. **1**: 39. 1852.

Coahuila. Texas to Arizona; type from hills at the head of the San Felipe, Texas.

Stems very numerous, 3.5 to 21 cm. long, fruticulose below, erectish or ascending, densely leafy, canescently puberulous; leaves linear-oblong or oblong-lanceolate, 2 to 6 mm. long, 0.6 to 1.3 mm. wide, thick, flattened above, gland-dotted, canescent-puberulous; racemes 1 or 2-flowered; flowers purple; wings obovate, 5 to 5.5 mm. long; capsule oblong; aril shortly 3-lobed.

44a. **Polygala macradenia glanduloso-pilosa** (Chod.) Blake, Contr. Gray Herb. n. ser. **47**: 56. 1916.

Polygala glanduloso-pilosa Chod. Bot. Jahrb. Engler **52**: Beibl. **115**: 72. 1914.

San Luis Potosí.

Less pubescent; leaves linear or linear-lanceolate, 1.2 to 3 mm. long, 0.3 to 0.5 mm. wide, concave or sulcate above, sparsely incurved-puberulous.

45. **Polygala purpusii** T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 88. 1910.

Known only from the type locality, Acatitlán, Puebla.

Fruticulose, several-stemmed, erect, 25 cm. high, densely canescent-pilosulous on the younger parts; leaves oval to oblong-oval, rarely orbicular, 9 to 14 mm. long, 4 to 11 mm. wide; racemes terminal, 4.5 cm. long; wings obovate-oval, 4.7 mm. long; keel whitish with yellowish tip; capsule suborbicular, 3 mm. long; aril 1.2 mm. deep, the 2 lobes oval, appressed.

46. **Polygala conzattii** Rose. Contr. U. S. Nat. Herb. **13**: 307. 1911.

Known only from the type locality, Cerro San Antonio, Oaxaca.

Stems 40 cm. long, slender, green, incurved-pubescent; leaves ovate-oval or obovate, 15 mm. long, cuspidate at the truncate-rounded apex or retuse; racemes very loose, 1.8 to 20 cm. long; wings obovate, 4.5 mm. long; capsule quadrate-orbicular, 3.5 mm. long; aril 1.4 mm. long, with large corneous umbo, the 2 lateral lobes oblong, appressed.

47. **Polygala parryi** A. W. Benn. Journ. Bot. Brit. & For. **17**: 140. 1879.

San Luis Potosí.

Suffruticulose, procumbent below, 9 cm. long or less, several-stemmed, incurved-puberulous; leaves oval to orbicular, 6 to 11 mm. long, rounded to obtuse at each end; wings obovate, 3.5 mm. long; capsule orbicular, venose, plump, 3.5 mm. long; aril 1.5 mm. deep, with small corneous umbo and 2 oblong appressed lobes.

48. **Polygala tehuacana** T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 273. 1912.

Known only from the vicinity of the type locality, mountains north of Tehuacán, Puebla.

Suffruticulose, many-stemmed, erect, about 15 cm. high, canescent-puberulent; leaves oblong, 5 to 10 mm. long, 1.5 to 2.5 mm. wide, obtusish, puberulous; racemes mostly 1-flowered; flowers purplish-yellowish; wings oval-obovate, 6 mm. long; capsule oval, ciliate, 4.8 mm. long; seed silky-pilose; aril with small umbo and 2 oblong lateral lobes.

49. **Polygala floribunda** Benth. Pl. Hartw. 58. 1840.

Polygala americana floribunda Kuntze, Rev. Gen. Pl. **1**: 48. 1891.

Chiapas; type from Zonaguia. Guatemala.

Frutescent, erect, about 1.5 meters high, incurved-pubescent or strigillose; leaves ovate, 3.5 to 9 cm. long, 1.2 to 3.8 cm. wide, acute, finely reticulate, strigillose or glabrate; racemes loose, up to 23 cm. long, rarely branched; flowers violet-purple; wings suborbicular, 8 to 11 mm. long and wide, venose; capsule transversely broad oblong, obcordate, 8 mm. long; seed globose, 3 mm. thick; aril 2 mm. high, fleshy-coriaceous, not lobed.

50. Polygala apopetala T. S. Brandeg. Proc. Calif. Acad. II. **2**: 130. *pl. 3*. 1889.

Southern Baja California; type from Comondú.

Shrub or small tree, 5 meters high or less, the branches strigillose; leaves ovate, 2.5 to 5 cm. long, 1.7 to 2.2 cm. wide, sparsely strigillose; racemes terminal, loose, 5 to 19 cm. long; flowers pinkish purple; wings suborbicular, 12 to 15 mm. long and wide, reticulate; capsule quadrate-orbicular, emarginate, 1.5 to 1.9 cm. long; seed ellipsoid, 9 mm. long; aril corneous, 0.5 mm. long.

51. Polygala fishiae Parry, Proc. Davenport Acad. **4**: 39. 1884.

Northern Baja California; type collected near Sauzal, Todos Santos Bay. Southern California.

Frutescent, about 1.5 meters high, glabrous or very sparsely strigillose; leaves oblong or oblong-lanceolate, 1.7 to 5 cm. long, 4 to 14 mm. wide, rounded or retuse, glabrous; racemes 2.5 to 20 cm. long; flowers purplish, whitish, and yellowish, 8.5 mm. long; wings obovate, ciliolate; capsule suborbicular, 7.5 mm. long; seed pilose, 5 mm. long.

52. Polygala nitida T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 272. 1912.

Known only from the type locality, Bagre, Minas de San Rafael, San Luis Potosí.

Frutescent, decumbent, finely incurved-puberulous, about 20 cm. long; lower leaves elliptic to oval, 1 to 2 cm. long, 7.5 to 12.5 mm. wide, rounded, cuspidate, reticulate, shining, glabrous or sparsely puberulous beneath along costa, the upper more oblong; racemes 3 to 9-flowered, 1.5 to 3.5 cm. long; flowers rose-colored; wings oblong-obovate, 5.5 mm. long; keel yellowish; capsule 4 mm. long, oval, subreticulate-striate.

53. Polygala eucosma Blake, Contr. Gray Herb. n. ser. **47**: 72. 1916.

Coahuila to Hidalgo; type from the Sierra Madre south of Saltillo, Coahuila. Southern New Mexico.

Fruticulose, many-stemmed, procumbent, 4.5 to 20 cm. long or more, minutely incurved-puberulous; leaves oval or elliptic, 4 to 9 mm. long, 2 to 6.5 mm. wide, acute or obtuse, coriaceous, scarcely reticulate, glabrous or very sparsely incurved-puberulous; racemes 2 or 3-flowered; flowers rosy; wings obovate, 4 to 4.5 mm. long, 1.8 to 2.8 mm. wide.

54. Polygala lindheimeri A. Gray, Bost. Journ. Nat. Hist. **7**: 150. 1850.

Polygala emoryi Blake, Contr. Gray Herb. n. ser. **47**: 72. 1916.

Nuevo León. Texas and New Mexico; type from the upper Guadalupe and Pierdenales rivers, Texas.

Stems several, fruticulose below, erect to decumbent, densely spreading-pilose or pilosulous or rarely incurved-spreading-pubescent, about 18 cm. long; lower or all the leaves elliptic or oval, rarely orbicular, 5 to 13 mm. long, 3 to 12 mm. wide, coriaceous, spreading-pilosulous or incurved-spreading-puberulous, reticulate, the middle and upper usually oblong or lance-oblong and acute; racemes 2 to 8-flowered, geniculate; wings oblong-obovate, 4.5 to 5 mm. long; capsule oblong, striate.

55. Polygala tweedyi Britton; Wheelock, Mem. Torrey Club **2**: 143. 1891.

Polygala lindheimeri parvifolia Wheelock, Mem. Torrey Club **2**: 143. 1891.

Polygala arizonae Chod. Mém. Soc. Hist. Nat. Genève **31**[2]: 108. 1893.

Polygala arizonae tenuifolia Chod. Mém. Soc. Phys. Hist. Nat. Genève **31**[2]: 109. 1893.

Polygala texensis Robinson in A. Gray, Syn. Fl. **1**[1]: 451. 1897.

Polygala parvifolia Woot. & Standl. Contr. U. S. Nat. Herb. **19**: 392. 1915.

Polygala blepharotropis Blake, Contr. Gray Herb. n. ser. **47**: 73. 1916.

Polygala lithophila Blake, Contr. Gray Herb. n. ser. **47**: 74. 1916.

Polygala pycnophylla T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 366. 1917.

Sonora, Coahuila, and San Luis Potosí. Oklahoma and western Texas to Arizona; type from Tom Green County, Texas.

Suffruticulose, many-stemmed, spreading to erect, incurved-puberulous, 7 to 28 cm. high; leaves dimorphous or uniform, linear to lanceolate, elliptic, or ovate-lanceolate, 4 to 26 mm. long, 1 to 6 mm. wide, the lowest broader than the others, coriaceous, reticulate, incurved-puberulous; racemes 3 to 22-flowered, geniculate; flowers rosy or whitish; wings obovate, 4 to 5.3 mm. long; capsule oval to oblong.

56. **Polygala minutifolia** Rose, Contr. U. S. Nat. Herb. **13**: 307. 1911.

Polygala nudata T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 183. 1911.

Coahuila and Nuevo León; type collected near Monterrey, Nuevo León.

Stems very numerous, fruticulose, erect, about 15 cm. high, strigillose or subglabrous; leaves squamiform, linear-lanceolate, 1 to 4.5 mm. long, 0.5 mm. wide, acuminate; racemes straight, 4 to 6-flowered; flowers white; wings oval-obovate, 4 mm. long; capsule oblong, 2.8 mm. long.

57. **Polygala desertorum** T. S. Brandeg. Proc. Calif. Acad. II. **2**: 130. 1889.

Southern Baja California; type from Agua Dulce.

Frutescent, several or many-stemmed, erect, strigillose, 25 cm. high; leaves linear or linear-lanceolate, 9 to 18 mm. long, 1 to 1.5 mm. wide, acute, firm; racemes loose, 5 to 9 cm. long; flowers purple and yellow; wings oblong-obovate, glabrous, 8 mm. long, appearing apiculate; capsule oval-oblong, glabrous, 5.5 mm. long; seed subsericeous, 3.5 mm. long.

58. **Polygala semialata** S. Wats. Proc. Amer. Acad. **17**: 326. 1882.

Coahuila, Nuevo León, and Zacatecas; type from Monterrey, Nuevo León.

Stems numerous from a fruticulose base, erect or lax, almost filiform, minutely puberulous, 8 to 21 cm. long; leaves linear, 5 to 8.5 mm. long, 0.5 to 1 mm. wide; racemes 3 to 12.5 cm. long; flowers whitish; wings oval-obovate, 1.4 mm. long; capsule narrowly oblong, curved, 3.6 mm. long, 1.3 mm. wide, the upper cell larger and distinctly winged; seeds cylindric, curved, 2.5 mm. long.

59. **Polygala hemipterocarpa** A. Gray, Pl. Wright. **2**: 31. 1853.

Chihuahua to Hidalgo; type collected near "Deserted Rancho," on the border of Sonora. Texas to Arizona.

Stems several, erect, fruticulose below, glabrous, slightly glaucous, 12 to 56 cm. high; leaves linear, 6 to 23 mm. long, 0.6 to 1 mm. wide, acute; racemes 3 to 21 cm. long; flowers white; wings obovate, 3.5 to 4 mm. long; capsule oblong, 5 mm. long, the upper cell broadly scarious-winged; seed 2.7 mm. long.

60. **Polygala watsoni** Chod. Mém. Soc. Phys. Hist. Nat. Genève **31** [2]: 285. 1893.

Polygala acicularis S. Wats. Proc. Acad. Amer. Acad. **21**: 445. 1886. Not *P. acicularis* Oliver, 1868.

Known only from the type locality, Santa Eulalia Mountains, Chihuahua.

Stems numerous, ascending from a woody base, 35 cm. long or less, finely incurved-puberulous; leaves linear-acicular, 4 to 11 mm. long, 0.4 to 0.6 mm. wide, acuminate, 2-sulcate beneath; racemes 6 to 11 mm. long, about 10-flowered; flowers white; wings obovate, 5 mm. long; capsule elliptic, narrow-margined on both cells, 3 mm. long; seed 2.6 mm. long.

61. **Polygala scoparioides** Chod. Mém. Soc. Phys. Hist. Nat. Genève **31** [2]: 284. 1893.

Polygala scoparia multicaulis A. Gray, Pl. Wright. **1**: 38. 1852.

Polygala wrightii A. Gray; A. W. Benn. Journ. Bot. Brit. & For. **17**: 205. 1879, as synonym.

Sonora to Coahuila and San Luis Potosí. Texas to Arizona.

Stems numerous, angled, finely incurved-puberulous, 9 to 30 cm. high; leaves linear-acicular, 7 to 14 mm. long, 0.6 to 1.3 mm. wide, acute to acuminate, strongly 2-sulcate beneath; racemes 1.5 to 7.8 cm. long; flowers white; wings spatulate-obovate, 2.6 to 3 mm. long, appearing acute by inflexion; capsule oblong-elliptic, 3 to 3.5 mm. long, 1.6 mm. wide; seed 2.5 to 3 mm. long; aril 1 to 1.9 mm. long.

62. Polygala dolichocarpa Blake, Contr. Gray Herb. n. ser. **47**: 107. 1916.

Known only from the type locality, Minas de San Rafael, San Luis Potosí.

Stems several, suffruticulose below, 10 to 35 cm. high, sulcate, sparsely incurved-puberulous, soon becoming nearly leafless; leaves linear, 3 to 4.5 mm. long, 0.3 mm. wide, acuminate, thickish, convex and veinless beneath; racemes loose, 5 to 10 cm. long; flowers white; wings spatulate-obovate, 2.7 to 3.2 mm. long; capsule oblong, 2 mm. long, 1 mm. wide, the upper cell very narrowly margined; seed 1.5 mm. long, cylindric; aril 1 mm. long.

63. Polygala scoparia H. B. K. Nov. Gen. & Sp. **5**: 399. 1821.

? *Polygala mexicana* Moc.; DC. Prodr. **1**: 333. 1824.

Polygala flagellaria Pavón; Chod. Mém. Soc. Phys. Hist Nat. Genève **31**[2]: 282. 1893, as synonym.

Polygala filiformis Pavón; Chod. Mém. Soc. Phys. Hist. Nat. Genève **31**[2]: 282 1893, as synonym.

Mexico and Veracruz; type collected near the City of Mexico.

Stems numerous, fruticulose below, slender, striate, finely incurved-puberulous, 7.5 to 13 cm. long; leaves rather crowded, linear-acicular, 5 to 9 mm. long, 0.4 to 1 mm. wide, acuminate, cuspidate, thickish, 1-nerved but not sulcate beneath; racemes dense or loose below, 0.5 to 2.3 cm. long; flowers white; wings obovate, 2.9 mm. long; capsule oval-oblong, 2.7 to 3 mm. long, 1.5 mm. wide, the upper cell narrowly winged; seed cylindric, 2.2 to 2.5 mm. long; aril 1.5 mm. long.

64. Polygala michoacana Robins. & Seat. Proc. Amer. Acad. **28**: 103. 1893.

San Luis Potosí to Puebla and Michoacán; type from Pátzcuaro, Michoacán.

Habit and general characters of *P. scoparia;* leaves up to 1.5 mm. wide; racemes 0.7 to 4.2 cm. long; wings cuneate-obovate, 2.5 mm. long, 1 mm. wide; capsule suborbicular, 2 to 2.5 mm. long, 1.5 to 1.8 mm. wide; seed 1.7 to 2 mm. long; aril 1.2 to 1.8 mm. long.

65. Polygala viridis S. Wats. Proc. Amer. Acad. **17**: 325. 1882.

Known only from the type locally, Caracol Mountains, Coahuila.

Several-stemmed, suffruticulose, spreading, densely spreading-puberulous, 5.5 to 11 cm. long; leaves obovate-spatulate, 5 to 11 mm. long, 1.5 to 3.6 mm. wide, coriaceous, spreading-puberulous; racemes loose, 1 to 2.5 cm. long; flowers green with narrow white margin; wings obovate, 2.6 mm. long; capsule oval-oblong, narrowly winged above, 2.8 mm. long, 1.5 mm. wide; seed 2 mm. long; aril 1.2 mm. long.

2. SECURIDACA L. Sp. Pl. 707. 1753.

Shrubs or trees, usually scandent; leaves alternate, entire, with peziziform stipular glands; flowers medium or large, in terminal and axillary, often panicled racemes; outer sepals free or the 2 lower united; wings large, petaloid; keel with a fimbriate crest; stamens 8; fruit a 1-celled samara, with a large wing on the lower side.

One species of the genus, known as "contraveneno" and "palomita morada," is said to be used in Nicaragua as a remedy for snake bites.

Leaves strigillose to sparsely pubescent beneath; pedicels strigillose or pubescent with incurved hairs ..... **1. S. diversifolia.**
Leaves densely and softly pilosulous or pilose beneath; pedicels densely and softly spreading or ascending-puberulous ..... **2. S. sylvestris.**

1. Securidaca diversifolia (L.) Blake.

Polygala diversifolia L. Sp. Pl. 703. 1753.

Securidaca acuminata Schlecht. Linnaea **14**: 382. 1840. Not *S. acuminata* St. Hil. 1829.

Securidaca schlechtendaliana Walp. Repert. Bot. **1**: 236. 1842.

Elsota schlechtendaliana Kuntze, Rev. Gen. Pl. **1**: 46. 1891.

? *Securidaca myrtifolia* Chod. Bull. Herb. Boiss. **3**: 546. 1895.

Tamaulipas to Michoacán (or Guerrero) and southward. Central America to Ecuador; West Indies.

Trailing or high-climbing shrub, strigillose or ascending-puberulous; leaves elliptic-oblong to ovate or oval, 3.8 to 12 cm. long, 2.2 to 5.7 cm. wide, thick, above somewhat shining, prominulous-reticulate and paler beneath; racemes usually 6 to 14 cm. long; flowers pink to purplish, the keel with yellow tip; wings suborbicular to oval-ovate, 8.5 to 11.8 mm. long, 6 to 8 mm. wide; samara puberulous, 4 to 6 cm. long; fruiting cell wing-margined on upper side, the margin prolonged beyond the cell and connate with the proper wing. "Flor de arrayán" (Oaxaca).

2. Securidaca sylvestris Schlecht. Linnaea **14**: 381. 1840.

Elsota sylvestris Kuntze, Rev. Gen. Pl. **1**: 46. 1891.

Veracruz to Tepic and southward; type from Jalapa, Veracruz. Central America.

Shrub, climbing to a height of 25 meters, the branchlets densely and softly puberulous; leaves ovate to elliptic or oblong-ovate, 2.7 to 7.5 cm. long, 1.2 to 3.3 cm. wide, dull both sides and softly pubescent; racemes 1.5 to 11 cm. long; flowers wine-red or rosy; wings suborbicular, 8 to 11 mm. long; samara spreading-puberulous, 3.8 to 4.7 cm. long; fruiting cell narrowly winged on upper side, the wing prolonged for 3 to 7 mm. beyond the fruiting cell and connate with proper wing.

3. MONNINA Ruiz & Pav. Syst. Veg. Peruv. Chil. 169. 1798.

Herbs or shrubs, very rarely scandent; leaves in ours estipulate; flowers racemed; outer sepals free or the 2 lower united; wings petaloid; keel not crested; stamens 8 or 6; fruit (in the following species) drupaceous, 1-celled, 1-seeded, with rugose endocarp surface and thin fleshy exocarp.

Racemes not at all comose; bracts ovate, obtuse to acute, 1.2 to 2.5 mm. long.
Peduncles and young branches densely pilose-tomentose. **1. M. schlechtendaliana.**
Peduncles and young branches strigillose ..... **2. M. xalapensis.**
Racemes comose toward apex; bracts lance-subulate to ovate, acuminate to attenuate, 2.5 to 7 mm. long.
Stem and leaves merely strigillose or incurved-puberulous ..... **3. M. sylvatica.**
Stem and leaves spreading-pilosulous or hirsutulous.
Branches and leaves softly spreading-pilosulous; leaves oval, cuneate to rounded at base ..... **4. M. guatemalensis.**
Branches and leaves hirsutulous; leaves lanceolate, long-attenuate at base. **5. M. subserrata.**

1. **Monnina schlechtendaliana** D. Dietr. Syn. Pl. **4**: 912. 1847.
? *Monnina mexicana* Don, Hist. Dichl. Pl. **1**: 367. 1831.
? *Monnina caerulea* Don. Hist. Dichl. Pl. **1**: 367. 1831.
Monnina angustifolia Schlecht. Linnaea **14**: 380. 1840. Not *M. angustifolia* DC. 1824.
Monnina stenophylla Steud. Nom. Bot. ed. 2. **2**: 157. 1841. Not *M. stenophylla* St. Hil. 1829.
Monnina erioclada Gandog. Bull. Soc. Bot. France **60**: 455. 1913.
Tepic to Morelos; type collected near the City of Mexico.
Branching shrub, the branches in youth like the peduncles densely and usually griseously pilose-tomentose with spreading crisped hairs, in age subglabrate; leaves elliptic to lance-elliptic, 4.5 to 8 cm. long, 1 to 2.4 cm. wide, thin, beneath appressed-puberulous and along costa spreading-pilose; racemes solitary or few, dense, 6 cm. long or less; flowers purplish; wings suborbicular, 4 to 4.8 mm. long; drupe obliquely ellipsoid, 6 to 7 mm. long.

2. **Monnina xalapensis** H. B. K. Nov. Gen. & Sp. **5**: 414. 1821.
? *Monnina bifurcata* DC. Prodr. **1**: 339. 1824.
? *Monnina ciliolata* DC. Prodr. **1**: 340. 1824.
? *Monnina obscura* Don, Hist. Dichl. Pl. **1**: 367. 1831.
? *Monnina ciliolosa* Don, Hist. Dichl. Pl. **1**: 368. 1831.
Monnina ocampi Villada, Mem. Trab. Com. Cient. Pachuca 215. 1865.
Monnina aestuans xalapensis Kuntze, Rev. Gen. Pl. **1**: 48. 1891.
Veracruz; type from Jalapa. Guatemala to Costa Rica.
Shrub, about 3 meters high, strigillose, subglabrate; leaves oblanceolate or obovate-elliptic to elliptic, 3.2 to 8.5 cm. long, 1 to 3 cm. wide, sparsely strigillose; racemes 11 cm. long or less; wings suborbicular-oval or oval, 5 to 6 mm. long; drupe 6 to 8.5 mm. long.

3. **Monnina sylvatica** Schlecht. Linnaea **5**: 231. 1830.
? *Monnina deppei* Don, Hist. Dichl. Pl. **1**: 367. 1831.
Monnina evonymoides Schlecht. Linnaea **14**: 380. 1840.
Monnina sylvicola Chod. Bull. Soc. Bot. Belg. **30**[1]: 303. 1891.
Michoacán to Veracruz and Chiapas; type from Jalapa, Veracruz. Central America.
Branching, apparently shrubby, incurved-puberulous; leaves lance-ovate to elliptic or oval, 7.3 to 12 cm. long, 2.5 to 6 cm. wide, sparsely strigillose; racemes 18 cm. long or less; bracts lance-subulate, 5 mm. long; wings suborbicular, 4 to 4.7 mm. long; drupe crested, 6 to 7 mm. long.

4. **Monnina guatemalensis** Chod. Bull. Herb. Boiss. **4**: 249. 1896.
Chiapas. Northern Guatemala; type from Cobán.
Shrub with stout, yellow-green, spreading-pilosulous branches; leaves oval, 5.5 to 11 cm. long, 2.6 to 7 cm. wide, short-pointed, yellowish green; racemes several, 16 cm. long or less; bracts lance-ovate, acuminate, 4.8 to 7 mm. long; wings obovate-suborbicular, 4.3 to 4.8 mm. long; drupe 8 mm. long.

5. **Monnina subserrata** Chod. Bull. Herb. Boiss. **4**: 250. 1896.
Mexico, without definite locality.
Branches stout, hirsutulous with very soft thick hairs; leaves lanceolate, 6.5 to 8 cm. long, 2.8 to 3.5 cm. wide or smaller, acute, cinerascent-hirsutulous both sides, the younger tomentose; racemes comose; wings obovate-cuneate.

76. EUPHORBIACEAE. Spurge Family.

Trees or shrubs; juice often milky; leaves usually alternate, sometimes opposite, entire, dentate, or lobate; stipules often present; flowers unisexual, monoe-

cious or dioecious, variously arranged, usually regular; perianth commonly small, sometimes showy, often wanting; anthers 2-celled; fruit usually capsular, sometimes drupaceous, commonly 3-celled but often with fewer or more numerous cells; seeds frequently carunculate.

A large family of plants, represented in Mexico also by numerous herbaceous species. The sap usually has purgative and often poisonous properties.

Flowers surrounded by an involucre containing both pistillate and staminate flowers; perianth none or minute.
- Involucre cuplike, regular ---------- 1. **EUPHORBIA.**
- Involucre very irregular, oblique ---------- 2. **PEDILANTHUS.**

Flowers not involucrate or, if so, the involucre containing only staminate or pistillate flowers; perianth present and usually well developed.
- Ovules 2 in each cell; stamens, at least the outer ones, opposite the sepals.
  - Leaves all or mostly opposite ---------- 3. **TETRACOCCUS.**
  - Leaves alternate.
    - Fruit drupaceous; flowers racemose, dioecious ---------- 4. **HIERONYMA.**
    - Fruit capsular, rarely fleshy; flowers never racemose.
      - Flowers monoecious ---------- 5. **PHYLLANTHUS.**
      - Flowers dioecious ---------- 6. **ASTROCASIA.**
- Ovule 1 in each cell; stamens, at least the outer ones, alternate with the sepals.
  - Stamens in bud bent inward, the apex of the anther turned downward.
    - Staminate flowers usually with petals; flowers mostly in terminal racemes ---------- 7. **CROTON.**
  - Stamens erect in bud.
    - A. Calyx lobes valvate.
      - Petals present in the staminate flowers.
        - Petals 8 to 12; stamens numerous ---------- 8. **GARCIA.**
        - Petals 4 or 5; stamens 5 to 15.
          - Petals entire; stamens in 2 or 3 series ---------- 9. **DITAXIS.**
          - Petals lobed; stamens in one series ---------- 10. **CHIROPETALUM.**
      - Petals none.
        - Stamens numerous, the filaments repeatedly branched; leaves lobed. 11. **RICINUS.**
        - Stamens few or numerous, the filaments simple; leaves not lobed.
          - Styles united; plants usually with stinging hairs.
            - Inflorescence subtended by 2 large showy bracts; stamens usually 20 to 30 ---------- 12. **DALECHAMPIA.**
            - Inflorescence with small inconspicuous bracts; stamens 3 or fewer ---------- 13. **TRAGIA.**
          - Styles distinct; plants without stinging hairs.
            - Anther cells elongate, often cylindric and curved, separated. 14. **ACALYPHA.**
            - Anther cells globose, or oblong and adnate.
              - Anther cells globose ---------- 15. **BERNARDIA.**
              - Anther cells elongate.
                - Leaves entire; styles lacerate ---------- 16. **ADELIA.**
                - Leaves dentate; styles entire ---------- 17. **ALCHORNEA.**
    - AA. Calyx lobes imbricate.
      - Corolla present or, if absent, the plants with stinging hairs. 18. **JATROPHA.**
      - Corolla none; plants never with stinging hairs.
        - Leaves deeply lobed ---------- 19. **MANIHOT.**

Leaves entire or toothed.
  Capsule large, 5 to 20-celled, elastically dehiscent; bracts large, membranaceous, inclosing the buds, in anthesis irregularly cleft ---------- 20. **HURA.**
  Capsule small, usually 3-celled, or the fruit drupaceous and many-celled.
    Stamens numerous ---------- 21. **MABEA.**
    Stamens 1 to 3.
      Staminate calyx none or rudimentary.
        Inflorescence terminal ---------- 22. **DALEMBERTIA.**
        Inflorescence axillary ---------- 23. **GYMNANTHES.**
      Staminate calyx well developed.
        Calyx 3 to 6-parted.
          Seeds carunculate; inflorescence usually terminal. **24. SEBASTIANIA.**
          Seeds ecarunculate; inflorescence axillary. **25. CORYTHEA.**
        Calyx shallowly lobate.
          Stamens united; fruit drupaceous ---- 26. **HIPPOMANE.**
          Stamens distinct; fruit capsular.
            Column of the capsule present, the seeds usually persistent upon it after dehiscence of the capsule. **27. SAPIUM.**
            Column none, but the receptacle usually persistent after the fall of the capsule cells, becoming indurate, 2 or 3-horned ---------- 28. **STILLINGIA.**

1. EUPHORBIA L. Sp. Pl. 450. 1753.

REFERENCE: Boissier in DC. Prodr. **15**[2]: 7–187. 1865.

Shrubs or small trees with milky juice; leaves alternate, opposite, or verticillate, on long or short petioles, usually entire; flowers involucrate, the involucre cuplike, 4 or 5-lobed, with 4 or 5 glands within, the glands often with petal-like appendages; perianth none; flowers unisexual; stamen 1 in the staminate flowers; fruit a 3-lobed capsule.

One of the largest genera of plants, represented in Mexico also by many herbaceous species. The genus is divided by some authors into several, but the present writer has preferred to consider the species as belonging to a single genus.

Euphorbia splendens Bojer, the "crown-of-thorns," a native of Madagascar, is often cultivated in Mexico, where it is known as "corona de Cristo." It has somewhat climbing stems which are covered with long stout spines; the involucre is subtended by two large red bracts.

A. Leaves alternate, only those of the inflorescence, if any, opposite.
  Glands of the involucre without petal-like appendages.
    Leaves 1 cm. long or shorter ---------- 1. **E. longecornuta.**
    Leaves 2 to 15 cm. long or larger.
      Leaves and stems pubescent ---------- 2. **E. fulva.**
      Leaves and stems glabrous or nearly so.
        Bracts bright red; leaves long-petiolate, broadest at or below the middle, often lobed ---------- 5. **E. pulcherrima.**
        Bracts green, white, or yellowish, rarely pink; leaves sessile or short-petiolate, broadest above the middle, entire.
          Leaves 2 to 4.5 cm. long; floral bracts acute ---------- 6. **E. xylopoda.**

Leaves 6 to 30 cm. long or larger; bracts suborbicular.
Leaves mostly 6 to 15 cm. long, the blade decurrent to the base of the petiole ---------- **3. E. calyculata.**
Leaves about 30 cm. long, on naked petioles ---------- **4. E. elata.**
Glands of the involucre with petal-like appendages.
Plants normally leafless ---------- **7. E. antisyphilitica.**
Plants leafy, at least in the inflorescence.
Appendages bright red; leaves glabrous ---------- **8. E. fulgens.**
Appendages white or yellowish or, if reddish, the leaves pubescent.
Involucres glabrous ---------- **9. E. californica.**
Involucres pubescent.
Stems naked, the inflorescence leafy ---------- **10. E. consoquitlae.**
Stems leafy.
Stems very thick, gnarled and crooked, woody throughout. **11. E. misera.**
Stems long and slender, suffrutescent.
Leaves glabrous or nearly so ---------- **12. E. tresmariae.**
Leaves densely pilose beneath, at least when young. **13. E. oaxacana.**

AA. Leaves all opposite or verticillate.
Leaves opposite, more or less oblique at base, usually distichous, sometimes dentate; stipules deltoid to linear.
Leaves finely toothed ---------- **14. E. tomentulosa.**
Leaves entire.
Leaves acute ---------- **15. E. fruticulosa.**
Leaves rounded or obtuse at apex.
Capsule glabrous; leaves mostly 1 cm. long or shorter. **16. E. magdalenae.**
Capsule puberulent; leaves mostly 1 to 2 cm. long -- **17. E. anthonyi.**
Leaves mostly verticillate, not oblique at base, entire; stipules glandlike.
Leaves linear ---------- **18. E. peganoides.**
Leaves lanceolate to orbicular.
Involucres glabrous, the appendages nearly obsolete. **19. E. schlechtendalii.**
Involucres sparsely or densely pubescent, the appendages well developed.
Appendages of the glands linear to oblong, much longer than broad.
Appendages cleft into linear lobes ---------- **20. E. chiapensis.**
Appendages not cleft into linear lobes.
Bracts of the inflorescence inconspicuous, small, green. **21. E. tricolor.**
Bracts conspicuous, large, white ---------- **22. E. leucocephala.**
Appendages broadly ovate to reniform, as broad as long or broader.
Bractlets of the inflorescence white or pink, conspicuous. **23. E. lucii-smithii.**
Bracelets green, inconspicuous.
Leaves orbicular or nearly so, mostly 4 to 13 cm. wide. **24. E. cotinifolia.**
Leaves oblong or oblanceolate to ovate, 3 cm. wide or less.
Appendages longer than the tube of the involucre -- **25. E. xanti.**
Appendages shorter than the tube of the involucre.
Leaves obovate or oblanceolate, broadest above the middle, usually pubescent beneath ---------- **26. E. plicata.**
Leaves mostly ovate or elliptic, broadest at or below the middle, glabrous or nearly so ---------- **27. E. colletioides.**

1. **Euphorbia longecornuta** S. Wats. Proc. Amer. Acad. **25**: 161. 1890.

Nuevo León; type from Sierra de la Silla, near Monterrey.

Stems very thick and woody below, 20 cm. high, densely branched, minutely puberulent; leaves very numerous, oblong or elliptic, acute or acutish, very short-petiolate; glands with long-attenuate horns.

2. **Euphorbia fulva** Stapf, Kew Bull. **1907**: 294. 1907.

Euphorbia elastica Alt. & Rose, El Palo Amarillo 1. *pl. 1–4.* 1905. Not *E. elastica* Jumelle, 1905.

Euphorbiodendron fulvum Millsp. Field Mus. Bot. **2**: 305. 1909.

Jalisco and Guanajuato to Oaxaca.

Tree, 8 to 10 meters high, with smooth yellow bark; leaves 3 to 6 cm. long, 1 to 4 cm. wide, glabrous above or nearly so, densely pubescent beneath; flowering branches usually leafless, forming a 4 or 5-rayed umbel; involucre densely tomentose; capsule glabrous. Generally known as "palo amarillo"; "palo colorado,' "palo de cucaracha" (Oaxaca, *Reko*).

This tree is of some importance as a source of rubber. The latex is thin and yellowish white and does not coagulate readily. When dried it is a doughlike, dark yellow substance. By tapping, about a liter of the latex may be obtained from a tree. The greatest difficulty in development of the tree as a source of rubber is found in the separation of the rubber from the resin, the amount of the former being 18 to 20 per cent and of the latter 40 per cent. The resin is said to make an excellent varnish. A good drying oil, suitable for varnish, has been extracted from the seeds.[1]

3. **Euphorbia calyculata** H. B. K. Nov. Gen. & Sp. **2**: 59. 1817.

Tithymalus calyculatus Klotzsch, Abh. Akad. Berlin **1860**: 81. 1860.

Euphorbiodendron calyculatum Millsp. Field Mus. Bot. **2**: 305. 1909.

Michoacán and Guanajuato; type from Lake Pátzcuaro, Michoacán.

Shrub of small tree, glabrous throughout, the branches densely leafly; leaves oblanceolate, often very narrowly so, acute or obtuse, pale green; involucres in broad leafy umbels, the bracts suborbicular, whitish or tinged with red, apiculate. "Chupire," "chupiri," "chupireni" (Michoacán, Tarascan, "that which burns"); "tencuanete" or "tenquanete" (*Ramírez*).

The seeds are said to contain 30 per cent of oil, which has purgative properties similar to those of croton oil. The milky juice of the stems causes blisters upon the skin and painful inflamation. This species is said to yield a kind of rubber much inferior to that obtained from *E. fulva.* The plant is discussed by Hernández[2] in a chapter entitled "De Chupiri, seu Charapeti, aquam rubeo colore tingenti Arcano Venerei morbi." He states that the inhabitants of Michoacán employed the plant as a remedy for venereal diseases and other affections.

4. **Euphorbia elata** T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 55. 1914.

Known only from the type locality, Finca Irlanda, Chiapas.

Glabrous tree, 7 meters high; leaves oblanceolate, about 8 cm. wide; obtuse or acutish; cymes naked, long-pedunculate; involucres about 9 mm. broad, the lobes lacerate; ovary glabrous.

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[1] See F. Altamirano, El Palo Amarillo, pp. 1–3. *pl. 1–4*, Mexico, 1905; Altamirano, El palo amarillo como productor de caucho, Mexico, 1905; Otto Stapf, A new rubber tree; palo amarillo, Kew Bull. **1907**: 294–296. 1907.

[2] Thesaurus 120. 1651.

5. **Euphorbia pulcherrima** Willd.; Klotzsch, Allg. Gartenz. **2**: 27. 1834.
Poinsettia pulcherrima Graham, Edinburgh New Phil. Journ. **20**: 412. 1836.
Euphorbia fastuosa Sessé & Moc. Pl. Nov. Hisp. 80. 1887.

Jalisco to Oaxaca and Veracruz; cultivated in all the warmer parts of Mexico. Central America; cultivated generally in tropical regions.

Shrub or small tree, 1 to 8 meters high, the branches glabrous; leaves large, usually broadly ovate or panduriform, acuminate, long-petiolate, glabrous or sometimes pubescent beneath; bracts of the inflorescence large and leaflike, bright red; involucres yellow. "Flor de Pascua" (Michoacán, Guerrero, Veracruz, Hidalgo, etc., Central America, Cuba); "Santa Catarina," "flor de Santa Catarina" (Oaxaca); "Catalina" (Durango, Hidalgo); "paño holandés" (Oaxaca); "cuitla-xochitl" (Nahuatl); "flor de Nochebuena," "paño de Holanda," "flor de fuego," "Nochebuena"; "bandera" (Durango); "bebeta" (Veracruz); "pastora" (Costa Rica); "pastores" (Nicaragua); "Pascuas" (Philippines).

This plant, which is generally known as "poinsettia," is cultivated widely in tropical countries and also in hothouses in temperate regions. In the United States it is especially common in florists' shops about Christmas time. The bright red floral leaves make the plant extremely showy. It grows readily from cuttings.

The bark is said to contain a red coloring principle, and it is reported that the bracts yield a scarlet dye. In Mexico a decoction of the bracts is sometimes taken by nursing women to increase the flow of milk, but the practice is said to be dangerous. The leaves are applied as poultices for erysipelas and various cutaneous affectations, and Grosourdy states that the milky juice was employed by the Indians to remove hair from the skin.

6. **Euphorbia xylopoda** Greenm. Proc. Amer. Acad. **33**: 480. 1898.

Known only from the type locality, hills of Las Sedas, Oaxaca, altitude 1,800 meters.

Slender glabrous shrub, 0.5 to 1 meter high; leaves elliptic or obovate, 5 to 12 mm. wide, rounded to acutish at apex, pale beneath; involucres terminal, solitary, the floral leaves green and white.

7. **Euphorbia antisyphilitica** Zucc. Abh. Akad. Wiss. München **1**: 292. 1829–30.
Euphorbia occulta Klotzsch in Seem. Bot. Voy. Herald 277. 1856.
? *Euphorbia cerifera* Alcocer, Anal. Inst. Méd. Nac. Méx. **11**: 155. 1911.

Coahuila to Hidalgo and Puebla.

Stems numerous, suffrutescent, 1 meter high or less, usually pale green, minutely puberulent or glabrous, leafless, simple or branched; leaves said to be linear; involucres puberulent, in small clusters along the stems; capsule glabrous. "Candelilla" (Zacatecas, San Luis Potosí, Coahuila, Durango, Nuevo León).

A kind of wax thickly covers the branches, and factories in Nuevo León and San Luis Potosí have engaged in the extraction of this substance. The plant frequently grows with the guayule (*Parthenium argentatum* A. Gray). To obtain the wax, the branches are boiled in water, whereupon it rises to the surface. It is grayish in the crude state but after refining becomes yellow and finally white. It is used (mixed with paraffin) for candles, which burn with a bright light and agreeable odor. It is said to be excellent for ointments and for soap making, and has been found suitable for phonograph records and as an insulating agent in electrical work. The wax has been used also in shoe polish, floor polish, and lubricants, and for waterproofing. The plant has purgative properties and is much used in Mexico as a remedy for venereal diseases.

8. **Euphorbia fulgens** Karw. Allg. Gartenz. **2**: 26. 1834.
Euphorbia jacquiniaeflora Hook. in Curtis's Bot. Mag. *pl. 3673*. 1839.
Trichosterigma fulgens Klotzsch, Abh. Akad. Berlin **1860**: 42. 1860.
Oaxaca and probably elsewhere; type from Zacatepec.
Stems suffruticose, glabrous; leaves slender-petiolate, lanceolate or narrowly lanceolate, 6 to 10 cm. long, 1 to 2.5 cm. wide, acuminate; involucres few, axillary, solitary or cymose, the lobes petal-like, bright red; capsule glabrous.
A showy plant, sometimes cultivated in hothouses.

9. **Euphorbia californica** Benth. Bot. Voy. Sulph. 49. *pl. 23B*. 1844.
Euphorbia hindsiana Benth. Bot. Voy. Sulph. 51. *pl. 24*. 1844.
Euphorbia comonduana Millsp. Proc. Calif. Acad. II. **2**: 229. 1889.
Trichosterigma californicum Klotzsch & Garcke, Abh. Akad. Berlin **1860**: 42. 1860.
Trichosterigma hindsianum Klotzsch & Garcke, Abh. Akad. Berlin **1860**: 42. 1860.
Baja California, Sonora, and Sinaloa; type from Magdalena Bay, Baja California.
Shrub, 0.5 to 2 meters high, glabrous throughout; leaves long-petiolate, usually orbicular or nearly so, 0.8 to 3 cm. long, rounded or emarginate at base, thin or somewhat fleshy; involucres solitary or clustered, with short whitish appendages.

10. **Euphorbia consoquitlae** T. S. Brandeg. Univ. Calif. Publ. Bot. **7**: 327. 1920.
Type from Consoquitla, Veracruz.
Branched shrub with greenish brnches; involucres in small leafy-bracted panicles, pubescent, long-pedunculate, the lobes about 2 mm. long, obtuse; capsules glabrous.

11. **Euphorbia misera** Benth. Bot. Voy. Sulph. 51. 1844.
Trichosterigma miserum Klotzsch & Garcke, Abh. Akad. Berlin **1860**: 42. 1860.
Euphorbia benedicta Greene, Pittonia **1**: 263. 1889.
Baja California; type from San Quentín. Southern California.
Shrub, 1 to 2 meters high, or a small tree with very thick trunk, the branches gray or brownish; leaves slender-petiolate, the blades orbicular or nearly so, mostly 1 cm. long or shorter, usually pubescent; involucres mostly terminal, solitary or cymose, with whitish appendages; capsule glabrous or pubescent.

12. **Euphorbia tresmariae** (Millsp.) Standl.
Euphorbia subcaerulea tresmariae Millsp. U. S. Dept. Agr. N. Amer. Fauna **14**: 88. 1899.
Known only from the type locality, María Madre Island, Tepic.
Slender shrub; leaves slender-petiolate, the blades mostly rhombic-ovate or ovate-oval, 0.8 to 1.5 cm. long, thin, obtuse or rounded at the apex; involucres numerous, with whitish appendages; capsule glabrous.

13. **Euphorbia oaxacana** Robins. & Greenm. Proc. Amer. Acad. **32**: 37. 1896.
Euphorbia latericolor T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 377. 1913.
Aklema oaxacana Millsp. Field Mus. Bot. **2**: 416. 1916.
Chiapas, Oaxaca, and Veracruz; type from Monte Albán, Oaxaca, altitude 1,740 meters.
Slender shrub, 0.5 to 1.5 meters high, the branches pubescent at first but soon glabrate; leaves slender-petiolate, the blades oval or ovate, 2 to 4 cm. long, obtuse, pubescent on both surfaces when young; involucres clustered or cymose, lateral or terminal.

14. **Euphorbia tomentulosa** S. Wats. Proc. Amer. Acad. **22**: 476. 1887.
Chamaesyce tomentulosa Millsp. Field Mus. Bot. **2**: 412. 1916.
Baja California and Sonora; type from Rosario, Baja California.
Low shrub, 60 cm. high or less, with dichotomous branches; leaves short-petiolate, oval or rounded-oval, 5 to 17 mm. long, finely pubescent; involucres pubescent, clustered at the ends of the branches, the glands purplish, with white appendages; capsule glabrous.

15. **Euphorbia fruticulosa** Engelm.; Boiss. in DC. Prodr. **15**^{2}: 38. 1865.
Chamaesyce fruticosa Millsp. Field Mus. Bot. **2**: 409. 1916..
Known only from the type locality, Saltillo, Coahuila.
Glabrous erect shrub, 30 cm. high or less; leaves ovate, glaucescent, 4 to 6 mm. long.

16. **Euphorbia magdalenae** Benth. Bot. Voy. Sulph. 50. 1844.
Euphorbia blepharostipula Millsp. Contr. U. S. Nat. Herb. **1**: 77. 1890.
Chamaesyce magdalenae Millsp. Field Mus. Bot. **2**: 410. 1916.
Baja California; type from Magdalena Bay.
Low slender shrub with glabrous or minutely puberulent branches; leaves nearly sessile, oblong or oval, often emarginate; appendages of the glands white.

17. **Euphorbia anthonyi** T. S. Brandeg. Erythea **7**: 7. 1899.
Euphorbia clarionensis T. S. Brandeg. Erythea **7**: 7. 1899.
Baja California; type from San Benito Island.
Stout shrub, 40 cm. high or less, nearly glabrous; leaves nearly sessile, broadly oblong or oblong-obovate, rounded at apex, very unequal at base; glands of the involucre dark brown, the appendages well developed or nearly obsolete.

18. **Euphorbia peganoides** Boiss. Cent. Euphorb. 22. 1860.
Aklema peganoides Millsp. Field Mus. Bot. **2**: 416. 1916.
Colima; type from some unknown locality in Mexico.
Shrub, glabrous or nearly so; leaves 2.5 to 8 cm. long, nearly sessile; involucres glabrous or sparsely puberulent, mostly in terminal cymes, the appendages white, semiorbicular.

19. **Euphorbia schlechtendalii** Boiss. Cent. Euphorb. 18. 1860.
Alectoroctonum ovatum Schlecht. Linnaea **19**: 252. 1847.
Euphorbia mayana Millsp. Field Mus. Bot. **1**: 304. *pl. 16.* 1896.
Euphorbia nelsonii Millsp. Bot. Gaz. **26**: 268. 1898.
Aklema ovata Millsp. Field Mus. Bot. **2**: 416. 1916.
Tamaulipas to Sinaloa, Oaxaca, and Yucatán; type from Actopán and Papantla, Veracruz. Guatemala and Nicaragua.
Shrub or small tree, 1 to 4.5 meters high, glabrous or nearly so; leaves slender-petioled, the blades variable in shape, orbicular, ovate, or broadly obovate, 1 to 5 cm. long, rounded to acutish at apex; involucres in terminal cymes, the appendages of the glands usually very narrow; capsule glabrous "Sac-chacah" (Yucatán, Maya); "mulatilla" (Oaxaca).
The sap is said to yield a kind of rubber.

20. **Euphorbia chiapensis** T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 54. 1914.
Eumecanthus chiapensis Millsp. Field Mus. Bot. **2**: 414. 1916.
Oaxaca and Chiapas; type from Sierra de Tonalá, Chiapas.
Slender glabrous shrub, 1 meter high; leaves slender-petiolate, ovate or lance-ovate, 3 to 6 cm. long, obtuse; involucres in terminal and axillary cymes; appendages of the glands each cleft into 2 linear lobes.

21. Euphorbia tricolor Greenm. Proc. Amer. Acad. **33**: 479. 1898.

Aklema tricolor Millsp. Field Mus. Bot. **2**: 417. 1916.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Slender shrub, 1 meter high or less, the branches puberulent at first; leaves slender-petiolate, oblong-ovate to ovate-orbicular, 1 to 2 cm. long, sparsely pubescent beneath; involucres in small terminal cymes, the appendages oblong-ovate, entire or nearly so, white or purplish.

22. Euphorbia leucocephala Lotsy, Bot. Gaz. **20**: 350. *pl. 24*. 1895.

Chiapas. Guatemala and Honduras; type from Cuilco, Guatemala.

Shrub, 1 to 2 meters high; leaves slender-petiolate, lance-oblong to oblong-oval, 3 to 6.5 cm. long, obtuse or rounded at apex, sparsely pubescent beneath; inflorescence terminal, large, of numerous cymes, the white bracts very conspicuous; appendages of the glands oblong-ovate. "Puno-puno," "flor de niño," "flor de Pascua." (Chiapas).

23. Euphorbia lucii-smithii Robins. & Greenm. Proc. Amer. Acad. **32**: 36. 1896.

Michoacán to Chiapas; type from Rancho de Calderón, Oaxaca. Guatemala.

Shrub, 3 to 4.5 meters high, the branches tomentulose; leaves slender-petiolate, usually elliptic, 2 to 5 cm. long, obtuse or acute, pubescent beneath; inflorescence terminal, leafy, the bracts white, pink, or red; appendages oblong or ovate, white; capsule glabrous.

Specimens from Chiapas are noteworthy because of their villous stems.

24. Euphorbia cotinifolia L. Amoen. Acad. **3**: 112. 1756.

Alectoroctonum cotinifolium Schlecht. Linnaea **19**: 252. 1845.

Alectoroctonum scotanum Schlecht. Linnaea **19**: 252. 1845.

Alectoroctonum yavalquahuitl Schlecht. Linnaea **19**: 252. 1845.

Euphorbia scotana Boiss. in DC. Prodr. **15**^{2}: 60. 1865.

Aklema cotinifolia Millsp. Field Mus. Bot. **2**: 416. 1916.

Oaxaca and Veracruz. Central America and northern South America; type from Curaçao.

Shrub or tree, 3 to 6 meters high; leaves long-petioled, rounded-ovate or orbicular, 5 to 14 cm. long, glabrous beneath or sparsely pubescent; involucres in dense terminal cymes; appendages of the glands broader than long, crenate. "Trompillo," "piñoncillo," "mala-mujer" (Oaxaca); "mata-gallina" (Veracruz); "barrabás" (Costa Rica); "sapo" (Nicaragua); "hierba mala" (Guatemala); "lechera" (Venezuela); "manzanillo" (Colombia).

The milky sap has violent emetic-cathartic properties, and in doses of even small quantity is poisonous. It has been employed by some of the Indians of Central America for criminal poisoning. The natives of certain parts of South America are said to make use of it as an arrow poison and for poisoning fish. The juice is sometimes used to cauterize ulcers. The seeds also are said to have drastic purgative properties.

25. Euphorbia xanti Engelm.; Boiss. in DC. Prodr. **15**^{2}: 62. 1865.

Euphorbia gymnoclada Engelm. Proc. Amer. Acad. **5**: 171. 1861. Not *E. gymnoclada* Boiss. 1860.

Aklema xanti Millsp. Field Mus. Bot. **2**: 417. 1916.

Baja California; type from Cabo de San Lucas.

Shrub, 1 to 3 meters high, with glabrous branches; leaves petiolate, linear-lanceolate to elliptic or broadly obovate, glabrous or nearly so; involucres few, axillary or in terminal cymes; appendages white or pink, rounded-obovate. "Liga."

The leaves are remarkably variable in form, and it may be that the material represents two species; but the involucre characters are uniform. The milky

juice of the plant sometimes gets upon the lips and faces of feeding animals and causes the hair to fall out. If it comes into contact with their eyes it produces severe inflammation and even blindness.

26. Euphorbia plicata S. Wats. Proc. Amer. Acad. **21**: 438. 1886.

Aklema plicata Millsp. Field Mus. Bot. **2**: 417. 1916.

Chihuahua and Sonora to Jalisco; type from Hacienda San Miguel, southwestern Chihuahua.

Shrub, 1.5 to 2.5 meters high, with glabrous branches; leaves petiolate, 2.5 to 10 cm. long, obtuse; involucres in terminal cymes or axillary clusters; appendages of the glands orbicular, entire or crenulate, white; capsule glabrous. "Candelilla china" (Sinaloa).

In Sinaloa the juice is said to be used in very small doses as a purgative.

27. Euphorbia colletioides Benth. Bot. Voy. Sulph. 163. 1844.

Euphorbia padifolia T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 54. 1914.

Aklema colletioides Millsp. Field Mus. Bot. **2**: 416. 1916.

Sonora to Oaxaca; type from Acapulco, Guerrero.

Shrub, about a meter high, with glabrous stems; leaves slender-petiolate, 3 to 6 cm. long, obtuse or acute, pale beneath; involucres numerous, in broad terminal cymes; appendages of the glands white, semiorbicular; capsule glabrous.

It is probable that *E. ligustrina* Boiss.,[1] described from Mexico, is a synonym, but it is described as having ovate appendages.

DOUBTFUL SPECIES.

EUPHORBIA ROSSIANA Pax, Repert, Sp. Nov. Fedde **8**: 162. 1910. Type from Zapotitlán, near Tehuacán, Puebla. The leaves are not described.

2. PEDILANTHUS Neck. Elem. Bot. 2: 354. 1790.

REFERENCE: Millspaugh, Field Mus. Bot. **2**: 353–371. 1913.

Shrubs with fleshy branches, the juice milky; leaves alternate, deciduous; flowers monoecious, small, surrounded by an oblique involucre; fruit a 3-lobate capsule.

The following vernacular names are reported for plants of the genus whose specific determination is doubtful: "Perico" (Durango); "aymoz" (Chiapas); "tamaulipa" (Veracruz).

Involucre hood-shaped, the appendix larger than the tube ..... **1. P. finkii.**
Involucre shoe-shaped, the appendix smaller than the tube.
  Lobe of the appendix entire.
    Staminate pedicels pubescent, the pistillate ones glabrous. **2. P. tithymaloides.**
    Staminate and pistillate pedicels glabrous.
      Leaves glabrous ..... **3. P. parasiticus.**
      Leaves pubescent.
        Glands of the appendix 4 ..... **4. P. pringlei.**
        Glands 2 ..... **5. P. campester.**
  Lobe of the appendix bipartite or tripartite.
    Lobe of the appendix tripartite.
      Divisions of the appendix all on one plane ..... **6. P. itzaeus.**
      Divisions of the appendix on different planes, 2 of them superior and one inferior ..... **7. P. peritropoides.**

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[1] Cent. Euphorb. 22. 1860.

Lobe of the appendix bipartite.
  Colored floral bracts absent.
    Peduncle centrally affixed to the involucre tube____8. **P. macrocarpus.**
    Peduncle affixed posteriorly to the tube.
      Appendix projecting along the margin of the fissure__9. **P. aphyllus.**
      Appendix not projecting along the margin of the fissure.
        Tube of the appendix glabrous inside_____10. **P. nodiflorus.**
        Tube pubescent inside_____11. **P. cymbiferus.**
  Colored floral bracts present, conspicuous, exceeding the inflorescence.
    Involucral tube glabrous.
      Glands of the appendix 2_____12. **P. articulatus.**
      Glands of the appendix 4_____13. **P. bracteatus.**
    Involucral tube puberulent or pilose.
      Capsule with hornlike projections_____14. **P. spectabilis.**
      Capsule without hornlike projections.
        Involucral tube pilose_____15. **P. pavonis.**
        Involucral tube puberulent.
          Pistillate pedicels pubescent, the staminate ones glabrous.
            Stamens glabrous_____16. **P. palmeri.**
            Stamens pubescent_____17. **P. tomentellus.**
          Pistillate and staminate pedicels glabrous.
            Lobes of the appendix all laterally compressed.
              Lobes glabrous_____18. **P. greggii.**
              Lobes puberulent_____19. **P. olsson-sefferi.**
            Lobes partly linear or flabellate.
              Lateral and fifth lobes of the tube flabellate.
                20. **P. involucratus.**
              Lateral and fifth lobes linear_____21. **P. rubescens.**

1. **Pedilanthus finkii** Boiss. in DC. Prodr. **15**[2]: 1261. 1866.

Known only from the type locality, Córdoba, Veracruz.

Shrub with hollow stems; leaves oblong, 10 to 14 cm. long, acute.

2. **Pedilanthus tithymaloides** (L.) Poit. Ann. Mus. Hist. Nat. **19**: 390. 1812.

Euphorbia tithymaloides L. Sp. Pl. 453. 1753.

Tamaulipas and perhaps elsewhere. Central America, West Indies, and northern South America.

Shrub, 1 to 2 meters high; leaves ovate or oblong, 3.5 to 7.5 cm. long, acute, cuneate at base, glabrous; involucres purple; capsule 9 mm. broad. "Candelilla" (Tamaulipas); "díctamno" (Nicaragua); "bítamo" (Costa Rica); "ítamo real," "gallito colorado" (Cuba); "díctamo real" (Cuba, Colombia); pié de niño" (Guatemala); "ponopinito" (Venezuela).

The milky juice is caustic, irritant, and emetic, and is sometimes used in domestic medicine. It is employed in some regions for venereal diseases. The plant is sometimes cultivated under the names "slipper-plant," "bird-cactus," "redbird cactus," and "Jew-bush."

3. **Pedilanthus parasiticus** Klotzsch & Garcke, Monatsb. Akad. Berlin 253. 1859.

Pedilanthus ramosissimus Boiss. in DC. Prodr. **15**[2]: 5. 1862.

Known only from the type collection, which is said to have come from Mexico.

Leaves 2.5 cm. long or shorter, rounded or subcordate at base.

4. **Pedilanthus pringlei** Robinson, Proc. Amer. Acad. **29**: 322. 1894.

Oaxaca to San Luis Potosí; type from Las Palmas, San Luis Potosí. Guatemala.

Shrub, 1 to 1.5 meters high; leaves 4 to 5 cm. long, acuminate, pubescent; involucres dark purplish red; capsule 7 mm. long, long-stipitate.

5. **Pedilanthus campester** T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 56. 1914.

Known only from the type locality, dry rocky plains, "Picaco-San Gerónimo," Oaxaca.

Leaves ovate, acute, about 6 cm. long and 3 cm. wide, pubescent.

6. **Pedilanthus itzaeus** Millsp. Field Mus. Bot. **1**: 305. 1896.

Yucatán; type from Silam. Cuba and Santo Domingo.

Glabrous shrub, 1.5 meters high; leaves ovate, acute, 5 to 7.5 cm. long, 4 to 6 cm. wide, fleshy; involucres light pink. "Yaxahalche" (Yucatán, Maya).

Sometimes cultivated as an ornamental plant. Dondé states that laundresses employ the leaves for bleaching clothes. Two or three drops of the milky juice in water are sometimes taken as a purgative, but its use is dangerous.

7. **Pedilanthus peritropoides** Millsp. Field Mus. Bot. **2**: 369. 1913.

Known only from the type locality, Coahuayula, Michoacán.

Glabrous shrub; leaves oblong to ovate, 12 to 15 cm. long, 5 to 6 cm. wide, rounded at apex.

8. **Pedilanthus macrocarpus** Benth. Bot. Voy. Sulph 49. *pl. 23. f. A.* 1844.

Baja California and Sonora to Colima; type from Magdalena Bay, Baja California.

Shrub, about a meter high; capsule about 2 cm. broad. "Candelilla" (Baja California).

The juice is said to yield a kind of rubber.

9. **Pedilanthus aphyllus** Boiss.; Klotzsch & Garcke, Abh. Akad. Berlin 106. 1860.

Pedilanthus calcaratus Schlecht. Linnaea **19**: 155. 1847.

Veracruz and Puebla.

Shrub, a meter high or less, with whitish branches, usually leafy; involucre red, 2 cm. long. "Periquito" (Oaxaca, *Reko*; perhaps relating to some other species); "gallitos" (Puebla, *Urbina*).

10. **Pedilanthus nodiflorus** Millsp. Field Mus. Bot. **1**: 305. 1896.

Yucatán; type from Silam.

Shrub, sometimes 2 meters high, widely branched, leafless; involucre red, 8 mm. long.

11. **Pedilanthus cymbiferus** Schlecht. Linnaea **19**: 253. 1847.

Type from somewhere in Mexico.

Branches pubescent, leafless; involucres 12 mm. long.

12. **Pedilanthus articulatus** (Klotzsch & Garcke) Boiss. in DC. Prodr. **15**^{2}: 6. 1862.

Diadenaria articulata Klotzsch & Garcke, Abh. Akad. Berlin 108. 1860.

Known only from the type, this said to have come from Mexico.

Leaves oblong, 4 to 5 cm. long, obtuse or retuse, cuneate at base, puberulent

13. **Pedilanthus bracteatus** (Jacq.) Boiss. in DC. Prodr. **15**^{2}: 6. 1866.

Euphorbia bracteata Jacq. Pl. Hort. Schönbr. **3**: 14. *pl. 276.* 1798.

Based on specimens said to have come from Mexico.

Shrub, 1.2 meters high; leaves 10 cm. long, glabrous, oblong, obtuse.

14. **Pedilanthus spectabilis** Robinson, Proc. Amer. Acad. **43**: 23. 1907.

Zacatecas and Jalisco to Guerrero; type from Iguala Canyon, Guerrero.

Shrub, about 1 meter high, with gray branches; leaves oblong to broadly ovate, 6 to 12 cm. long, rounded or obtuse at apex, pubescent beneath; involucre whitish, nearly 2 cm. long; capsule 1 cm. in diameter.

15. **Pedilanthus pavonis** (Klotzsch & Garcke) Boiss. in DC. Prodr. 15^2: 6. 1866.
Diadenaria pavonis Klotzsch & Garcke, Abh. Akad. Berlin 108. 1860.
Colima and perhaps elsewhere, the type from some unknown Mexican locality.
Leaves 12 to 17.5 cm. long, 6.5 to 7.5 cm. wide, subsessile, acute, glabrous; involucres 1.6 to 1.8 cm. long.
This is the name which has usually been applied to Mexican species of the genus by local writers. The following vernacular names have been reported, but they probably refer to other species: "Candelillo" or "candelilla" (Jalisco, Oaxaca); "jumete" (Jalisco, Oaxaca); "cordobán," "venenillo" (Oaxaca). The plant is reputed to have purgative, emetic, emmenagogue, and antisyphilitic properties.

16. **Pedilanthus palmeri** Millsp. Field Mus. Bot. **2**: 364. 1913.
Known only from Tepic, the type locality.
Leaves acute or obtuse, cuneate at base, glabrous, sometimes 15 cm. long; involucres red, 1.5 cm. long.

17. **Pedilanthus tomentellus** Robins. & Greenm. Amer. Journ. Sci. **50**: 164. 1896.
Oaxaca; type from the city of Oaxaca.
Shrub, 1.5 to 2.5 meters high: leaves 4 to 5 cm. long, acute, pubescent; involucres 1.2 cm. long. "Cordobán," "cordobancillo."

18. **Pedilanthus greggii** Millsp. Field Mus. Bot. **2**: 363. 1913.
Known only from the type locality, somewhere in Mexico.
Leaves oblong-lanceolate, about 9 cm. long and 3 cm. wide, acute, puberulent.

19. **Pedilanthus olsson-sefferi** Millsp. Field Mus. Bot. **2**: 363. 1913.
Known only from the type locality, Tomellín, Oaxaca.
Leaves oblong to ovate, 3 to 6 cm. long, obtuse, puberulent beneath; involucre 1 cm. long.

20. **Pedilanthus involucratus** (Klotzsch & Garcke) Boiss. in DC. Prodr. 15^2: 6. 1862.
Diadenaria involucrata Klotzsch & Garcke, Abh. Akad. Berlin 107. 1860.
Described from cultivated plants which were believed to be of Mexican origin.
Shrub, about a meter high; leaves petiolate, oblong, 7.5 cm. long, puberulent beneath.

21. **Pedilanthus rubescens** T. S. Brandeg. Zoe **5**: 209. 1905.
Sinaloa; type from Culiacán.
Shrub, 1 to 2 meters high, with pale branches; leaves 9 cm. long or smaller, ovate-lanceolate, nearly glabrous; floral leaves purplish red; involucres 2 cm. long.

DOUBTFUL SPECIES.

PEDILANTHUS GHIESBREGHTIANUS Baill. Adansonia **1**: 340. 1861. Described from Mexico.

PEDILANTHUS TEHUACANUS T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 55. 1914. Type from Tehuacán, Puebla. No material seen by the writer, the diagnosis too incomplete for determination of the position of the species.

3. TETRACOCCUS Engelm.; Parry, West Amer. Sci. 1: 13. 1885.

1. **Tetracoccus dioicus** Parry, West Amer. Sci. **1**: 13. 1885.
Tetracoccus engelmanni S. Wats. Proc. Amer. Acad. **20**: 373. 1885.
Northern Baja California; type from Santo Tomás.
Much-branched glabrous shrub; leaves mostly opposite, linear, 1 to 2.5 cm. long, entire; flowers small, dioecious, apetalous, mostly solitary in the axils; capsule 4-lobate, about 6 mm. in diameter.

4. **HIERONYMA** Allem. Pl. Nov. Bras. 1848.

1. **Hieronyma oblonga** (Tulasne) Muell. Arg. Linnaea **34**: 66. 1865.
Stilaginella oblonga Tulasne, Ann. Sci. Nat. III. **15**: 248. 1851.
Stilaginella benthami Tulasne, Ann. Sci. Nat. III. **15**: 248. 1851.
Puebla and Oaxaca. South America; type from British Guiana.
Tree or shrub; leaves alternate, obovate-lanceolate, 15 cm. long or smaller, subcuspidate, acute at base, lepidote-pubescent when young; flowers small, dioecious, racemose; fruit drupaceous.

5. **PHYLLANTHUS** L. Sp. Pl. 981. 1753.

Shrubs or small trees, usually glabrous; leaves commonly distichous, small or large, entire, stipulate; flowers small, racemose, paniculate, or fascicled in the axils; fruit a capsule, sometimes fleshy and succulent.

Several herbaceous species occur in Mexico. *P. grandifolius* L. has been reported from Mexico upon the basis of a specimen collected by Sessé and Mociño; this, however, came from Porto Rico. Some species of the genus are cultivated for ornament. Certain Old World species are employed for poisoning fish.

Petioles half as long as the blades or longer ---------- **1. P. neurocarpus.**
Petioles much less than half as long as the blades.
Staminate calyx 4-parted.
Fruit fleshy; stipules dentate ---------- **2. P. acidus.**
Fruit dry; stipules entire ---------- **3. P. nobilis.**
Staminate calyx 5- (or 6-) parted.
Anthers dehiscent by vertical slits.
Leaves rounded or very obtuse at apex, broadest above the middle. **4. P. galeottianus.**
Leaves acute or acuminate, broadest near base ---------- **5. P. purpusii.**
Anthers dehiscent by horizontal or oblique slits.
Flowers in elongate racemes or panicles.
Flowers racemose ---------- **6. P. oaxacanus.**
Flowers paniculate.
Stipules oblanceolate ---------- **7. P. tequilensis.**
Stipules linear-lanceolate or ovate-lanceolate ---------- **8. P. chiapensis.**
Leaves obovate-oblong.
Leaves ovate to ovate-oval.
Pistillate calyx lobes pinnately nerved ---------- **9. P. glaucescens.**
Pistillate calyx lobes 1-nerved ---------- **10. P. adenodiscus.**
Flowers solitary or fasciculate in the leaf axils.
Leaves acute or acuminate.
Staminate calyx 1 to 1.5 mm. long ---------- **11. P. acuminatus.**
Staminate calyx 2.5 mm. long ---------- **12. P. mocinianus.**
Leaves rounded or very obtuse at apex.
Leaves small, 5 mm. wide or narrower, broadest near apex. **13. P. subcuneatus.**
Leaves large, 1 to 3.5 cm. wide, broadest at or below the middle. **14. P. micrandrus.**

1. **Phyllanthus neurocarpus** Muell. Arg. Linnaea **34**: 69. 1865.
Tamaulipas and San Luis Potosí; type collected between Victoria and Tula, Tamaulipas.
Leaves orbicular-ovate, 1.2 to 3 cm. long, rounded-obtuse, glabrous.

2. Phyllanthus acidus (L.) Skeels, U. S. Dept. Agr. Bur. Pl. Ind. Bull. **148**: 17. 1909.

Averrhoa acida L. Sp. Pl. 428. 1753.

Cicca disticha L. Mant. Pl. **1**: 124. 1767.

Phyllanthus distichus Muell. Arg. in DC. Prodr. **15**^{2}: 413. 1866.

Specimens seen from Tamaulipas, Guerrero, and Oaxaca, but perhaps only cultivated in Mexico. Native of the East Indies but cultivated in most tropical regions, and sometimes naturalized.

Shrub or small tree; leaves orbicular to oval-ovate, mostly 5 to 6 cm. long, short-pointed, distichous upon slender branches, these resembling pinnate leaves; flowers pink, in lax panicles; fruit large and succulent, pale green; seed large, lobate. "Ciruela corteña" (Oaxaca); "manzana estrella" (Tamaulipas); "grosella" (Costa Rica, Nicaragua, Cuba); "cerezo común," "cerezo de la tierra" (Porto Rico); "cerezo occidental" (Cuba).

This plant is often cultivated in warm regions under the names "Otaheite gooseberry," "West Indian gooseberry," "star gooseberry," and "jimbling." The fruit is nearly 2 cm. in diameter, with firm, acid, and astringent flesh. It is usally pickled or made into preserves. The root and seeds are said to have purgative and cathartic properties. The wood is described as rather hard and fine-grained, with a specific gravity of 0.57.

3. Phyllanthus nobilis (L. f.) Muell. Arg. in DC. Prodr. **15**^{2}: 114. 1866.

Margaritaria nobilis L. f. Suppl. Pl. 428. 1781.

Cicca antillana Juss. Tent. Euphorb. 108. 1824.

Yucatán. West Indies and Central America.

Shrub or tree, 4 to 20 meters high; leaves short-petiolate, lance-oblong or elliptic-oblong, 5 to 12 cm. long, acute or acuminate, glabrous; fruit about 6 mm. in diameter. "Amortiguado," "avispillo," "higuerillo," "higuillo," "millo," "palo de millo," "yuquillo," "siete-cueros" (Porto Rico).

4. Phyllanthus galeottianus Baill. Adansonia **1**: 32. 1860–61.

Phyllanthus peninsularis T. S. Brandeg. Erythea **7**: 8. 1899.

Southern Baja California to Jalisco and Michoacán; type from Morelia, Michoacán.

Slender shrub, a meter high or less, or almost wholly herbaceous; leaves nearly sessile, rounded-obovate, 1 to 5 cm. long; flowers clustered in the axils.

5. Phyllanthus purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 55. 1914.

Known only from the type locality, Cerro del Boquerón, Chiapas.

Tree, 7 to 8 meters high, glabrous; leaves ovate or ovate-lanceolate, 2 to 3.5 cm. long, pale beneath.

6. Phyllanthus oaxacanus T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 185. 1915.

Known only from the type locality, San Gerónimo, Oaxaca.

Leaves short-petiolate, broadly ovate-oval, 4 to 5 cm. long, obtuse, glabrous.

7. Phyllanthus tequilensis Robins. & Greenm. Proc. Amer. Acad. **29**: 392. 1894.

Known only from the type locality, Tequila, Jalisco.

Leaves ovate-elliptic, 4.5 to 10 cm. long, rounded to acute at apex, pale beneath; capsule 3.5 cm. broad.

8. Phyllanthus chiapensis Sprague, Kew Bull. **1909**: 264. 1909.

Known only from the type locality, on dry hills, Cacate, Chiapas.

Shrub, 2 meters high; leaves 3.5 to 5 cm. long, 1.5 to 2.3 cm. wide, rounded at apex, subcuneate at base; flowers reddish; capsule 3 cm. broad or larger.

Reported by Hemsley as *P. laxiflorus* Benth.

9. **Phyllanthus glaucescens** H. B. K. Nov. Gen. & Sp. **2**: 115. 1817.
Yucatán Peninsula; type from Campeche. Guatemala.
Shrub; leaves ovate-oval to orbicular-elliptic, 9 to 22 cm. long, acute or short-pointed, glabrous, pale beneath; capsule more than 2 cm. in diameter. "Xpbixt-don" (Yucatán).

10. **Phyllanthus adenodiscus** Muell. Arg. Linnaea **32**: 23. 1863.
Tamaulipas, San Luis Potosí, and Veracruz; type from Papantla, Veracruz.
Shrub, 1.5 to 3 meters high; leaves rounded-ovate to oblong-elliptic, 8 to 15 cm. long, acuminate, glabrous, pale beneath; capsule 4 cm. long or larger.

11. **Phyllanthus acuminatus** Vahl, Symb. Bot. **2**: 95. 1791.
? *Phyllanthus sessei* Briq. Ann. Cons. Jard. Genève **4**: 224. 1900.
Baja California to San Luis Potosí, Yucatán, and Oaxaca. West Indies, Central America, and South America.
Shrub or tree, 3 to 6 meters high, with slender green angulate branches; leaves ovate to oval, mostly 3 to 4 cm. long, green; capsule about 4 mm. long. "Ciruelillo" (Tabasco); "chilillo," "gallina" (Costa Rica).

12. **Phyllanthus mocinianus** Baill. Adansonia **1**: 35. 1860.
Described from specimens believed to have come from Mexico.
Glabrous; leaves ovate or cordate-ovate, 1.5 to 3 cm. long.

13. **Phyllanthus subcuneatus** Greenm. Proc. Amer. Acad. **33**: 478. 1898.
Puebla; type from limestone ledges near Tehuacán.
Slender shrub, 1 meter high or less; leaves cuneate-obovate, 4 to 7 mm. long, glabrous; capsule 4 mm. broad.

14. **Phyllanthus micrandrus** Muell. Arg. Linnaea **32**: 27. 1863.
Phyllanthus pringlei S. Wats. Proc. Amer. Acad. **26**: 147. 1891.
Sinaloa to San Luis Potosí and Guerrero. Guatemala; type from Venezuela.
Slender shrub or tree, 2 to 6 meters high; leaves orbicular or rounded-ovate, 1 to 3.5 cm. long, thin, glabrous; flowers greenish white.

6. **ASTROCASIA** Robins. & Millsp. Bot. Jahrb. Engler **36**: Beibl. **80**: 19. 1905.

1. **Astrocasia phyllanthoides** Robins. & Millsp. Bot. Jahrb. Engler **36**: Beibl. **80**: 20. 1905.
Yucatán; type from Itzimna.
Shrub, 1 to 2 meters high; leaves deciduous, slender-petiolate, orbicular to ovate, 4 to 13 cm. long, rounded or obtuse at apex, entire, pale beneath; flowers dioecious, fasciculate on short lateral spurs, borne on long filiform pedicels; capsule 8 mm. long. "Xkahyuc," "xcaba-xpixtolon" (Maya).
This has been reported from Yucatán as *Phyllanthus nutans* Swartz.

7. CROTON L. Sp. Pl. 1004. 1753.

Trees or shrubs; leaves alternate, petiolate, stipulate, entire or dentate, rarely lobate; pubescence of stellate hairs or of scales; flowers small, monoecious or dioecious, with or without petals, racemose; fruit a more or less 3-lobate capsule.
Several herbaceous species are found in Mexico. *Croton eluteria* (L.) Swartz, of the Bahamas, produces the cascarilla bark of commerce, which is employed in medicine as a tonic.

Petals well developed in both staminate and pistillate flowers. Pubescence lepidote.
Leaves pinnately nerved ..... 1. **C. glabellus.**
Leaves 3 or 5-nerved at base.
Ovary and fruit smooth, densely lepidote ..... 2. **C. niveus.**
Ovary and fruit tuberculate, hispid ..... 3. **C. reflexifolius.**

Petals rudimentary or absent in one or both kinds of flowers.
  Petals rudimentary or absent in both kinds of flowers.
    Flowers monoecious ---------- 4. C. tenuilobus.
    Flowers dioecious.
      Staminate racemes long-pedunculate; capsule densely lepidote with short-rayed scales ---------- 5. C. neomexicanus.
      Staminate racemes sessile or short-pedunculate; capsule covered with long-rayed scales.
        Staminate racemes very short, few-flowered; leaves long-petiolate. 6. C. californicus.
        Staminate racemes elongate, many-flowered; leaves short-petiolate or subsessile ---------- 7. C. dioicus.
  Petals well developed in the staminate flowers, rudimentary or obsolete in the pistillate ones.
    Racemes interrupted, the pistillate portion separated from the staminate by a long sterile portion. Leaves dentate.
      Leaves obovate-oblong, acute at base ---------- 8. C. meissneri.
      Leaves broadly ovate, rounded or subcordate at base ---- 9. C. liebmanni.
    Racemes continuous.
      Lowest bracts of the racemes subtending both staminate and pistillate flowers.
        Glands none on the leaves.
          Leaves acuminate, denticulate ---------- 10. C. stipulaceus.
          Leaves obtuse or abruptly short-pointed at apex, entire. 11. C. suberosus.
        Glands present on the lower surface of the leaf near the base.
          Styles divided to the base, the branches laciniate or bifid.
            Leaves obscurely 5-nerved or often pinnate-nerved, rhombic-lanceolate ---------- 12. C. grewiaefolius.
            Leaves conspicuously palmate-nerved, broadly ovate. 13. C. gossypiifolius.
          Styles divided to the base, the branches, however, entire.
            Stipules subulate ---------- 14. C. panamensis.
            Stipules ovate or lance-ovate ---------- 15. C. draco.
Lowest bracts subtending only pistillate flowers.
  Pubescence of scalelike hairs.
    Leaves densely lepidote on the upper surface --- 16. C. amphileucus.
    Leaves glabrate on the upper surface.
      Leaves obtuse or rounded at apex ---------- 17. C. hypoleucus.
      Leaves long-acuminate ---------- 18. C. watsonii.
  Pubescence of stellate hairs.
    A. Stipules glandular-laciniate or glandular-denticulate.
      Pubescence of closely appressed, depressed hairs.
        Leaves glandular-ciliate ---------- 19. C. jucundus.
        Leaves not glandular-ciliate.
          Styles once dichotomus ---------- 20. C. adspersus.
          Styles 2 or more times dichotomus ---------- 21. C. soliman.
      Pubescence of loose spreading hairs.
        Styles once dichotomous, the branches entire.
          Stipules pinnately lobate ---------- 22. C. incanus.
          Stipules palmately lobate ---------- 23. C. suaveolens.

Styles 2 or more times dichotomous or, if once dichotomous, the branches not entire.
Leaves usually glandular-ciliate, entire or nearly so.
Stipules very short and inconspicuous; ciliation of the leaves inconspicuous----------24. **C. humilis.**
Stipules long and conspicuous; ciliation of the leaves very conspicuous.
Stamens about 40; divisions of the stipules long and slender; style branches entire--25. **C. ciliato-glandulosus.**
Stamens about 30; divisions of the stipules short and stout; style branches laciniate--------26. **C. pulcher.**
Leaves not ciliate, dentate.
Bracts laciniate----------27. **C. ovalifolius.**
Bracts entire.
Leaves denticulate----------28. **C. stylosus.**
Leaves coarsely duplicate-dentate---29. **C. macrodontus.**
AA. Stipules entire.
Style branches 2 or more times dichotomous, often laciniate. Leaves coarsely dentate ----------30. **C. repens.**
Style branches once dichotomous.
Stamens 20 to 50. Leaves with glands at base.
Stamens 35 to 50; leaves serrulate------31. **C. xalapensis.**
Stamens 20 to 30; leaves entire---------32. **C. subfragilis.**
Stamens 6 to 20.
Leaves with large glands on the lower surface at the base. 33. **C. mexicanus.**
Leaves without glands, or these very obscure.
Pistillate racemes very dense and congested in fruit, many-flowered; pistillate flowers sessile or nearly so.
Leaves entire, long-petiolate--------34. **C. cladotrichus.**
Leaves repand-dentate----------35. **C. francoanus.**
Pistillate racemes lax, usually few-flowered, if dense the pistillate flowers long-pedicellate.
Leaves rounded or very obtuse at apex.
Leaves mostly palmate-nerved at base; pistillate sepals accrescent----------36. **C. corymbulosus.**
Leaves pinnate-nerved; sepals not accrescent.
Base of the leaf broadly rounded or subcordate; leaves mostly oval----------37. **C. ehrenbergii.**
Base of the leaf cuneate or obtuse; leaves mostly oblong or ovate-oblong--------38. **C. torreyanus.**
Leaves, at least most of them, acute or acuminate.
Stipules large, semireniform, foliaceous, persistent. 39. **C. alamosanus.**
Stipules small, linear or subulate, early deciduous.
Leaves pinnate-nerved, the basal nerves not conspicuous.
Leaves perfectly glabrous on the upper surface. 40. **C. cortesianus.**
Leaves pubescent on the upper surface.
Leaves thin, green on the upper surface, soon glabrate----------41. **C. miradorensis.**

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Leaves thin, pale and densely and very finely stellate-pubescent on the upper surface.
42. C. rhamnifolius.

Leaves palmate-nerved, the basal nerves (usually 5) very conspicuous.

Lobes of the capsule compressed and acutish above.
43. C. flavescens.

Lobes of the capsule broadly rounded.

Upper leaf surface pale, nearly or quite as densely pubescent as the lower.

Leaves cordate at base, very short-petiolate; large shrub----------**44. C. magdalenae.**

Leaves not cordate at base, long-petiolate; very low shrub----------**36. C. corymbulosus.**

Upper leaf surface bright green, usually glabrate.

Leaves glabrous or nearly so beneath at maturity.

Leaves very scabrous on the upper surface, the hairs with enlarged bases.
45. C. calvescens.

Leaves not scabrous, the hairs without enlarged bases----------**46. C. sonorae.**

Leaves persistently and copiously pubescent beneath.

Pubescence of the lower leaf surface fine and appressed ----------**47. C. fragilis.**

Pubescence of the lower leaf surface coarse and spreading.

Capsule finely stellate-puberulent.
48. C. fruticulosus.

Capsule coarsely stellate-pillose.
49. C. morifolius.

1. **Croton glabellus** L. Amoen. Acad. 5: 409. 1760.

Croton schiedeanus Schlecht. Linnaea 19: 243. 1847.

Veracruz and Tabasco. Central America, West Indies, and northern South America.

Shrub or small tree, the pubescence of small brown scales; leaves oblong-elliptic or oblong-ovate, 5 to 20 cm. long, short-petiolate, abruptly short-acuminate, entire, glabrate; flowers in long slender racemes; capsule coarsely tuberculate. "Copalchí" (Tabasco, Costa Rica); "caobilla" (Veracruz *Ramírez*); "quizarrá copalchí" (Costa Rica).

The wood is said to be strong, fine-grained, and durable.

2. **Croton niveus** Jacq. Stirp. Amer. 255. *pl. 162. f. 2.* 1763.

Croton pseudo-china Schlecht. Linnaea 5: 84. 1830.

Croton arboreus Milllsp. Field Mus. Bot. 1: 303. *pl. 15.* 1896.

Colima to Tamaulipas, Yucatán, and Chiapas. Central America, northern South America, and West Indies; type from Cartagena, Colombia.

Shrub or tree (said sometimes to attain a height of 18 meters), the pubescence of silvery scales; leaves ovate or broadly ovate, 5 to 12 cm. long or larger, acute or acuminate, usually somewhat cordate at base, entire; flowers in long or short racemes; capsule about 9 mm. long. "Quina" (Oaxaca); "quina blanca" (Veracruz); "copalchí" (Veracruz, Oaxaca, Costa Rica, El

Salvador, Nicaragua); "vara blanca" (Tamaulipas); "salvia de la playa" (Colombia).

The bark is said to be similar in odor and flavor to cascarilla bark, for which it is sometimes substituted. It contains a bitter principle, copalchin, which is found also in other species of *Croton*. In commerce the bark is known as "copalchi" and "quina blanca," and it is employed as a tonic, especially in intermittent fevers. It was formerly exported to Europe for medicinal purposes, but is no longer used abroad. The leaves are closely covered with silvery or brownish hairs, but they are sometimes also short-pilose.

3. Croton reflexifolius H. B. K. Nov. Gen. & Sp. 2: 68. 1817.

Croton sylvaticus Schlecht. Linnaea 19: 240. 1847. Not *C. sylvaticus* Hochst. 1845.

Guerrero to Tamaulipas and Veracruz; type from Acapulco. Central America; reported from Colombia.

Shrub or small tree; leaves ovate or ovate-cordate, 5 to 10 cm. long, acuminate or abruptly acuminate, entire, finely silvery-lepidote, at least beneath, but often glabrate in age; flowers in long slender racemes; capsule about 12 mm. long, conspicuously muricate. "Copalchí" (various parts of Mexico, *Ramírez*, Costa Rica); "Solimán prieto" (San Luis Potosí, *Seler*).

4. Croton tenuilobus S. Wats. Proc. Amer. Acad. 21: 439. 1886.

Southwestern Chihuahua to Tepic; type from Hacienda San José, Chihuahua.

Slender shrub; leaves linear-lanceolate or linear-oblong, 2 to 6 cm. long, green above, pale beneath, finely stellate-pubescent; flowers short-racemose.

5. Croton neomexicanus Muell. Arg. Linnaea 34: 141. 1865.

Chihuahua to Nuevo León. Western Texas and southern New Mexico; type from western Texas.

Plants suffrutescent, 0.3 to 1.5 meters high, covered with close silvery radiate scales; leaves lanceolate to elliptic, 1 to 4 cm. long, petiolate, obtuse or rounded at apex, entire, usually green on the upper surface; staminate racemes slender, many-flowered, 4 to 8 cm. long.

Root bark said to be used as a purgative.

6. Croton californicus Muell. Arg. in DC. Prodr. 15^2: 691. 1866.

Baja California, Sonora, and Sinaloa. Southern Arizona and California; type from San Francisco, California.

Slender shrub, sometimes 1.5 meters high, or often herbaceous, the pubescence mostly of appressed radiate scales; leaves slender-petiolate, oblong to elliptic, 2.5 to 5 cm. long, obtuse, often green on the upper surface.

7. Croton dioicus Cav. Icon. Pl. 1: 4. *pl. 6.* 1791.

Croton elaeagnifolius Vahl; Geisel. Croton. Monogr. 9. 1807.

Croton gracilis H. B. K. Nov. Gen. & Sp. 2: 69. 1817.

Astrogyne crotonoides Benth. Pl. Hartw. 14, 1839.

Nuevo León to Durango, Oaxaca, and Veracruz.

Plants low, shrubby or frequently herbaceous, densely covered with appressed silvery scales; leaves short-petiolate, oval to oblong, 1.5 to 4.5 cm. long, obtuse, entire; staminate flowers in short dense spikes. "Rosval" (Nuevo León); "hierba del gato," "rubaldo," "robaldo" (Coahuila); "encinilla" (Durango, *Patoni*); "hierba del zorrillo" (Valley of Mexico, *Ramírez*, Oaxaca, *Reko*); "yepaxihuitl" (*Ramírez*); "epaxihuitl" (Nahuatl, "skunk-herb").

The seeds and root are reported to have drastic purgative properties. The plant is said to be used also for hysteria, and in baths for rheumatism.

8. Croton meissneri Muell. Arg. in DC. Prodr. **15**[2]: 665. 1866.

Known only from the type locality, near Orizaba, Veracruz.

Stems low, perhaps herbaceous; leaves oblong-obovate, 1.5 to 2.5 cm. long, obtuse, coarsely serrate, stellate-pubescent.

9. Croton liebmanni Muell. Arg. in DC. Prodr. **15**[2]: 665. 1866.

Known only from the type locality, near Santiago, Amatlán, Oaxaca.

Leaves long-petiolate, 4 to 8 cm. long, long-acuminate, biglandular at base; racemes slender, 5 to 6 mm. long; capsule 6 mm. long.

10. Croton stipulaceus H. B. K. Nov. Gen. & Sp. **2**: 85. 1817.

Valley of Mexico to Oaxaca; type collected near the City of Mexico.

Leaves long-petiolate, cordate-ovate, 6 to 10 cm. long, acuminate, denticulate, densely stellate-tomentose; racemes dense, many-flowered; capsule 9 mm. long. "Sangre de drago" (*Humboldt*).

The species is unknown to the writer.

11. Croton suberosus H. B. K. Nov. Gen. & Sp. **2**: 86. 1817.

Known only from the type locality, Acapulco, Guerrero.

Branches with corky fissured bark; leaves short-petiolate, 3 to 8 cm. long and nearly as broad, stellate-tomentose, shallowly cordate at base; racemes dense, 3 to 3.5 cm. long.

Known to the writer only from the description, which is strongly suggestive of *C. cladotrichus* Muell. Arg.

12. Croton grewiaefolius Muell. Arg. Linnaea **34**: 87. 1865.

Known only from the type locality, near the city of Oaxaca.

Leaves long-petiolate, rhombic-lanceolate, 5 to 8 cm. long, acuminate, acute at base, dentate, stellate-pubescent; racemes elongate.

13. Croton gossypiifolius Vahl, Symb. Bot. **2**: 98. 1791.

Reported from Oaxaca. Central America, northern South America, and West Indies; type from Trinidad.

Shrub or tree, sometimes 15 meters high, copiously stellate-tomentose; leaves cordate-ovate, often 30 cm. long, acute or acuminate; flowers in very long stout racemes. "Targuá" (Costa Rica); "sangre de drago" (Venezuela).

It is rather doubtful whether this species actually occurs in Mexico.

14. Croton panamensis (Klotzch) Muell. Arg. in DC. Prodr. **15**[2]: 546. 1866.

Cyclostigma panamense Klotzsch in Seem. Bot. Voy. Herald 105. 1853.

Veracruz, Puebla, Oaxaca, and Chiapas. Central America; type from Volcán de Chiriquí, Panama.

Tree, sometimes 35 meters high, with a trunk 60 cm. in diameter, the bark grayish white, nearly smooth, the crown flat; leaves long-petiolate, broadly ovate-cordate, usually 10 to 20 cm. long, acute or acuminate, densely stellate-pubescent, denticulate; racemes equaling or longer than the leaves. "Sangre de drago" (Chiapas); "targuá" (Costa Rica); "sangrillo" (Panama).

15. Croton draco Schlecht. Linnaea **6**: 360. 1831.

San Luis Potosí and Veracruz to Chiapas; type from Papantla, Veracruz.

Tree, 4.5 to 15 meters high, copiously stellate-tomentose; leaves long-petiolate, broadly ovate-cordate, 10 to 25 cm. long, acuminate, entire or denticulate; racemes usually very long. "Sangre de drago" (Veracruz, Chiapas, Oaxaca, Guatemala); "tlachinole," "sangregado" (Veracruz); "ezquahuitl," "árbol de sangre" (*Nueva Farmacopea Mexicana*); "cuate," "palo muela" (Sinaloa).

Reputed to have astringent properties, and said to be used locally as a remedy for fevers and for hardening the gums. The blood-red sap is bitter, and gives a red dye; it is employed as a remedy for hoof diseases in burros and horses.

16. **Croton amphileucus** Briq. Ann. Cons. Jard. Genève **4**: 227. 1900.

Known only from the type locality, near Real del Monte, Hidalgo, altitude 2,400 meters.

Shrub; leaves elliptic, 10 to 13 mm. long, obtuse, short-petiolate, densely lepidote on both surfaces, entire; racemes 5 to 10 mm. long.

Known to the writer only from the description.

17. **Croton hypoleucus** Schlecht. Linnaea **19**: 246. 1847.

Croton shepherdiaefolius Schauer, Linnaea **20**: 729. 1847.

Coahulia (?) to Hidalgo; type collected between Zimapán and San José del Oro, Hidalgo.

Shrub; leaves oblong-ovate, 3 to 4.5 cm. long, petiolate, entire, bright green on the upper surface, very densely silvery-lepidote beneath.

18. **Croton watsonii** Standl.

Croton elaeagnoides S. Wats. Proc. Amer. Acad. **26**: 147. 1891. Not *C. elaeagnoides* Balf. 1884.

Known only from the type locality, Las Palmas, San Luis Potosí.

Shrub or small tree, 3 to 4.5 meters high; leaves ovate or lanceolate, 1.5 to 5 cm. long, entire, bright green on the upper surface, densely silvery-lepidote beneath; racemes slender, 10 to 15 cm. long; capsule depressed, 5 mm. broad.

19. **Croton jucundus** T. S. Brandeg. Zoe **5**: 205. 1905.

Known only from the type locality, Yerba Buena, near Culiacán, Sinaloa.

Plant soon glabrate, green, very sparsely stellate-pubescent; leaves long-petiolate, ovate or lanceolate, 6 to 10 cm. long, attenuate, entire, ciliate with long slender gland-tipped hairs.

Perhaps only a form of *C. ciliato-glandulosus*.

20. **Croton adspersus** Benth. Pl. Hartw. 51. 1840.

Type from Morelia, Michoacán; reported from Oaxaca, Veracruz, and San Luis Potosí.

Leaves petiolate, ovate or ovate-lanceolate, 3.5 to 6 cm. long, acuminate, serrulate, stellate-puberulent. "Solimán" (*Seler*).

21. **Croton soliman** Schlecht. & Cham. Linnaea **6**: 361. 1831.

Veracruz, Tabasco, and Oaxaca; type from Papantla, Veracruz.

Slender green shrub; leaves long-petiolate, ovate or rhombic, 5 to 9 cm. long, cuspidate-acuminate, appressed-stellate beneath, obscurely crenate; flowers whitish. "Solimán" (Veracruz).

22. **Croton incanus** H. B. K. Nov. Gen. & Sp. **2**: 73. 1817.

San Luis Potosí to Hidalgo; type from Los Organos, Actopán.

Shrub, 2 meters high, densely stellate-pubescent; leaves ovate, 1.5 to 3.5 cm. long, obtuse, entire; racemes 2 to 3 cm. long.

Known to the writer only from the description.

23. **Croton suaveolens** Torr. U. S. & Mex. Bound. Bot. 194. 1859.

? *Croton virletianus* Muell. Arg. Linnaea **34**: 133. 1865–66.

Chihuahua, Coahuila, and San Luis Potosí. Western Texas; type collected along the Rio Grande.

Low, densely branched shrub, densely stellate-tomentose, the pubescence usually yellowish; leaves broadly rhombic-ovate, 1 to 3.5 cm. long, obtuse or acutish, thick, entire; racemes short and stout. "Encinillo" (Chihuahua).

Plant fragrant, used in baths in convalescence from fevers.

24. **Croton humilis** L. Syst. Nat. ed. 2. 1276. 1759.

Croton berlandieri Torr. U. S. & Mex. Bound. Bot. 193. 1859.

Nuevo León to Yucatán. Southern Florida and West Indies.

Slender shrub, a meter high or less, stellate-pubescent (usually sparsely so) and viscid; leaves rounded-ovate to lanceolate, 2 to 6 cm. long, rounded or cordate at base, usually acute at apex, nearly entire; racemes 3 to 5 cm. long; capsule 4 to 5 mm. long. "Ycaban," "icaban" (Yucatán).

This has been reported from Yucatán as *C. albidus* Muell. Arg. It may be that two species are represented by the material referred here, but a satisfactory basis of division is not apparent.

25. Croton ciliato-glandulosus Orteg. Hort. Matr. Dec. 51. 1797.

Croton penicillatus Vent. Choix Pl. Cels. 12. *pl. 12.* 1803.

Baja California and Sonora to Tamaulipas, Veracruz, and Chiapas. Guatemala and Honduras; Cuba.

Shrub, 1 to 2 meters high, densely stellate-tomentose; leaves long-petiolate, broadly ovate-cordate, 3 to 12 cm. long, acute or acuminate; capsule about 7 mm. long. "Solimán" (Tamaulipas, etc.); "picosa" (Querétaro); "canelilla" or "canelillo" (Oaxaca); "xunaxilase," "cuanaxonaxi," "xunalixase," "xonaxe" (Oaxaca); "enchiladora" (Oaxaca, Veracruz); "Solimán blanco" (*Seler*); "Dominguillo," "hierba de la cruz" (*Altamirano*); "palillo" (*Flores*); "chirca," "ciega-vista" (Guatemala, Honduras).

The plant has a strong aromatic odor. It is much used locally as a remedy for fevers, and is said to have purgative properties. It also is reputed to increase the flow of milk in goats which browse upon it. Seler states that (in Chiapas ?) it is the food plant of a red caterpillar which is eaten by the natives. The hairs of the leaves adhere to the hands and injure the eyes when introduced into the latter.

26. Croton pulcher Muell. Arg. in DC. Prodr. 15[2]: 644. 1866.

Puebla; type from Tehuacán.

Low shrub with stout branches, densely stellate-tomentose; leaves short-petiolate, broadly ovate, 4 to 5.5 cm. long, acutish.

Perhaps only a form of *C. ciliato-glandulosus.*

27. Croton ovalifolius West, Bidr. Beskr. St. Croix 307. 1793.

Oaxaca. West Indies and South America.

Shrub, green, sparsely stellate-pilose; leaves long-petiolate, oblong to elliptic or obovate, 1 to 3 cm. long, rounded or obtuse at apex, finely denticulate; sepals of the pistillate flowers large, accrescent, glandular-ciliate.

28. Croton stylosus Muell. Arg. Linnaea 34: 128. 1865.

Type from Mexico, the locality not known.

Leaves short-petiolate, rhombic-ovate, 6 to 10 cm. long, cuspidate-acuminate.

29. Croton macrodontus Muell. Arg. Linnaea 34: 128. 1865.

Veracruz and Oaxaca.

Green, sparsely stellate-pubescent shrub; leaves long-petiolate, ovate, 5 to 13 cm. long, long-acuminate, thin.

30. Croton repens Schlecht. Linnaea 19: 237. 1847.

Sinaloa to Oaxaca and Veracruz; type from Hacienda de la Laguna, Veracruz. Central America.

Slender shrub, often decumbent, green, stellate-pubescent; leaves usually short-petiolate, suborbicular to ovate, 2 to 7 cm. long, rounded to acute at apex, often shallowly lobate, crenate-dentate. "Tostoncillo" (El Salvador); "chacotote" (Guatemala Honduras).

The root is used locally for stomach affections.

31. **Croton xalapensis** H. B. K. Nov. Gen. & Sp. **2**: 85. 1817.

Veracruz to Chiapas; type from Jalapa, Veracruz. Central America.

Shrub or small tree, 2 to 9 meters high, copiously stellate-tomentose, at least when young; leaves long-petiolate, cordate-ovate, 8 to 20 cm. long or larger, acuminate or cuspidate-acuminate; racemes very long and slender. "Targuá," "terré," "targuacillo" (Costa Rica); "chirca" (Guatemala, Honduras).

The wood is white and weak. The gum which exudes from the trunk is used for cleaning the teeth.

32. **Croton subfragilis** Muell. Arg. Linnaea **34**: 111. 1865.

Known only from the type locality, between Tuxtla and Chiapas.

Leaves oblong-ovate, 10 to 15 cm. long, cuspidate-acuminate, stellate-pubescent with ferruginous hairs. "Copalchí."

33. **Croton mexicanus** Muell. Arg. Linnaea **34**: 113. 1865.

Described from Mexico, the locality not known.

Leaves oblong-ovate, 12 cm. long or shorter, stellate-pubescent with depressed hairs or glabrate, acuminate, entire or denticulate.

34. **Croton cladotrichus** Muell. Arg. Linnaea **34**: 124. 1865.

Croton purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 184. 1915.

Michoacán to Oaxaca.

Shrub, copiously stellate-pubescent or tomentose, the branches covered with thick corky bark; leaves mostly suborbicular, 6 to 15 cm. long, usually abruptly short-pointed, more or less cordate at base; spikes usually shorter than the leaves, very thick and dense. "Gordolobo" (Michoacán, Guerrero).

35. **Croton francoanus** Muell. Arg. Linnaea **34**: 124. 1865.

Known only from the type locality, near Oaxaca.

Leaves nearly sessile, broadly triangular-ovate, 5 to 10 cm. long, acuminate, cordate at base, whitish-tomentose beneath.

36. **Croton corymbulosus** Engelm. in Wheeler, Rep. U. S. Surv. 100th Merid. **5**: 242. 1878.

Chihuahua, Coahuila, and Sonora. Western Texas to southern Arizona; type from Camp Bowie, Arizona.

Plants low, woody at base, the stems clustered, densely silvery-pubescent throughout; leaves long-petiolate, orbicular to oblong, 2 to 4.5 cm. long; racemes 2 to 4 cm. long. "Encinilla" (Texas).

Tea made from the leaves is used in domestic medicine in western Texas, because of its sudorific and tonic properties.

37. **Croton ehrenbergii** Schlecht. Linnaea **19**: 248. 1847.

Hidalgo.

Slender shrub, 0.6 to 1.2 meters high; leaves short-petiolate, 1 to 3 cm. long, entire, densely silvery-pubescent beneath; racemes short, few-flowered.

38. **Croton torreyanus** Muell. Arg. in DC. Prodr. **15**^{2}: 579. 1866.

Coahuila and Nuevo León to Veracruz. Western Texas (type locality).

Shrub, 1 to 2 meters high, stellate-tomentose; leaves short-petiolate, 3 to 6 cm. long, entire; racemes 1 to 4 cm. long. "Salvia" (Tamaulipas).

39. **Croton alamosanus** Rose, Contr. U. S. Nat. Herb. **1**: 111. 1891.

Sonora to Oaxaca; type from Alamos, Sonora.

Shrub, 1 to 4 meters high; leaves nearly sessile, ovate or oblong-ovate, 5 to 14 cm. long, cordate at base, long-acuminate, green, thinly stellate-pubescent, entire or nearly so. "Ocotillo" (Sinaloa).

The resin is employed as a remedy for toothache.

40. Croton cortesianus H. B. K. Nov. Gen. & Sp. **2**: 83. 1817.

Croton trichocarpus Torr. U. S. & Mex. Bound. Bot. 196. 1859.

Sinaloa to Tamaulipas, Campeche, and Chiapas; type collected near Campeche. Western Texas.

Shrub, 1 to 3 meters high; leaves mostly oblong-ovate, 3 to 10 cm. long, short-petiolate, acute or acuminate, rounded or subcordate at base, stellate-pubescent beneath, bright green above; racemes often very long. "Palillo" (Tamaulipas, San Luis Potosí); "pozual," "puzual" (San Luis Potosí *Seler*); "ek-balam" (Maya, *Seler*); "pinolillo" (Tamaulipas).

The juice is applied as a caustic for the treatment of skin diseases.

41. Croton miradorensis Muell. Arg. in DC. Prodr. **15**[2]: 627. 1866.

Veracruz; type from Mirador.

Shrub; leaves ovate or oblong-ovate, 6 to 12 cm. long, acute or acuminate, rounded or subcordate at base, stellate-tomentose beneath.

42. Croton rhamnifolius H. B. K. Nov. Gen. & Sp. **2**: 75. 1817.

Yucatán to Oaxaca. West Indies and South America; type from Venezuela.

Shrub, 1 to 2 meters high; leaves oblong to ovate, 4 to 7 cm. long, short-petiolate, acute, densely stellate-tomentose beneath, entire, or near so. "Ecbalan," "xa-balam" (Yucatán).

This has been reported from Yucatán as *C. cortesianus*.

43. Croton flavescens Greenm. Proc. Amer. Acad. **39**: 81. 1903.

Southwestern Chihuahua to Guerrero; type from Monte León Station, Michoacán, altitude 1,500 meters.

Shrub, 1.5 to 2.5 meters high; leaves broadly ovate-cordate, 6 to 11 cm. long, usually long-acuminate, entire, densely stellate-pubescent beneath.

44. Croton magdalenae Millsp. Proc. Calif. Acad. II. **2**: 220. 1889.

Baja California; type from Magdalena Island.

Shrub, 1 to 3.5 meters high, very densely and finely stellate-tomentose throughout; leaves broadly cordate-ovate or rounded-cordate, 4 to 10 cm. long, acutish, short-petiolate, entire; racemes longer than the leaves.

45. Croton calvescens S. Wats. Proc. Amer. Acad. **26**: 147. 1891.

Jalisco and Michoacán; type from Chapala, Jalisco.

Shrub, green, pubescent at first but soon glabrate; leaves ovate or broadly ovate, acute or acuminate, rounded at base, 5 to 8 cm. long, serrulate; flowers in very long slender spikes.

46. Croton sonorae Torr. U. S. & Mex. Bound. Bot. 194. 1859.

Croton pringlei S. Wats. Proc. Amer. Acad. **12**: 373. 1885.

Croton gonzalezii Greenm. Proc. Amer. Acad. **39**: 81. 1903.

Sonora to Oaxaca; type from Sonora.

Slender shrub, 1 to 2 meters high, green and glabrate; leaves ovate or broadly ovate, 2 to 5 cm. long, long-acuminate, rounded at base, short-petiolate; racemes very slender and lax.

47. Croton fragilis H. B. K. Nov. Gen. & Sp. **2**: 75. 1817.

Croton sericeus Schlecht. Linnaea **5**: 85. 1830. Not *C. sericeus* Lam. 1786.

Sinaloa to Veracruz, Yucatán, and Chiapas. Northern South America; type from Cumaná, Venezuela.

Slender shrub, 1 to 4.5 meters high; leaves long-petiolate, lanceolate to broadly cordate-ovate, acute to long-acuminate, bright green above, whitish beneath; racemes long and slender, the flowers brownish yellow. "Taanché" (Yucatán).

The material referred here is very variable, and probably represents two or more species.

48. Croton fruticulosus Engelm.; Torr. U. S. & Mex. Bound. Bot. 194. 1859.

Chihuahua to Nuevo León. Western Texas and southern New Mexico; type from western Texas.

Aromatic shrub, about 1 meter high, densely stellate-tomentose; leaves long-petiolate, ovate or deltoid-ovate, 3 to 8 cm. long, acute to attentuate, rounded or subcordate at base, entire or nearly so. "Encinilla," "hierba loca" (Chihuahua, *Ramírez.*)

49. Croton morifolius Willd. Sp. Pl. 4: 535. 1805.

Croton sphaerocarpus H. B. K. Nov. Gen. & Sp. 2: 84. *pl. 105.* 1817.

Durango to Veracruz and Oaxaca.

Shrub, 1 to 3 meters high, copiously stellate-tomentose; leaves broadly ovate or cordate-ovate, 3 to 10 cm. long, acute to long-acuminate, entire or nearly so; racemes short or elongate. "Palillo" (Guanajuato, Querétaro, Oaxaca, Michoacán).

The plant is aromatic and contains an essential oil, which is applied externally for the relief of neuralgia. When inhaled, the oil is said to produce insensibility and paralysis. An infusion of the leaves is taken internally for pains in the stomach.

DOUBTFUL SPECIES.

CROTON GAUMERI Millsp. Field Mus. Bot. 2: 418. 1916. Type from Yucatán.

CROTON GLANDULOSEPALUS Millsp. Field Mus. Bot. 2: 419. 1916. Type from Yucatán.

CROTON MALVAVISCIFOLIUS Millsp. Field Mus. Bot. 2: 419. 1916. Type from Yucatán.

8. GARCIA Rohr, Skrivt. Naturh. Selsk. (Kjøbenhavn) 2: 217. 1792.

1. Garcia nutans Rohr, Skrivt. Naturh. Selsk. (Kjøbenhavn) 2: 217. *pl. 9.* 1792.

Sinaloa and Tepic and probably elsewhere. Central America, Colombia, and West Indies; type from Santa Marta, Colombia.

Small or large tree; leaves alternate, oblong-obovate, 10 to 20 cm. long, long-petiolate, short-acuminate, entire; flowers monoecious, about 1 cm. long; capsule 2 or 3-seeded, about 2.5 cm. wide, fulvous-tomentulose.

9. DITAXIS Vahl; Juss. Euphorb. Gen. Tent. 27. 1824.

REFERENCE: Pax & Hoffm. in Engl. Pflanzenreich IV. 147 [vi]: 51–77. 1912.

Small shrubs, commonly pubescent; leaves alternate, usually petiolate, entire or dentate, 3-nerved at the base, with small stipules; flowers small, monoecious or dioecious.

Several herbaceous species occur in Mexico.

Ovary and capsule glabrous.
- Plant densely sericeous, at least on the leaves ---------- **1. D. heterantha.**
- Plant glabrous ---------- **2. D. brandegei.**

Ovary and capsule pubescent.
- Flowers in long-pedunculate axillary racemes; leaves 2 to 6.5 cm. wide. **3. D. pringlei.**
- Flowers solitary or clustered in the axils, sessile or short-pedunculate; leaves mostly less than 2 cm. wide.
  - Staminodia none or very short ---------- **4. D. lanceolata.**
  - Staminodia well developed.
    - Flowers dioecious ---------- **5. D. palmeri.**

Flowers monoecious.
Petals of the pistillate flowers lance-linear_____6. **D. guatemalensis.**
Petals of the pistillate flowers ovate or rhombic-ovate.
Leaves linear to lanceolate_____7. **D. sericophylla.**
Leaves mostly ovate to oval.
Staminate petals longer than the calyx_____8. **D. manzanilloana.**
Staminate petals shorter than the calyx_____9. **D. tinctoria.**

1. **Ditaxis heterantha** Zucc. Abh. Akad. Wiss. München 15[2]: 735. 1829–30.
Argithamnia argentea T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 273. 1912.
Sinaloa, Querétaro, Guanajuato, Hidalgo, and San Luis Potosí; type from Tolimán, Querétaro.
Shrub with thick woody stems; leaves ovate or broadly ovate, 4 to 8 cm. long, acute or acuminate, entire or nearly so, short-petiolate, whitish-sericeous beneath, at least when young; inflorescence slender-pedunculate. "Azafrancillo" (Querétaro); "azafrán de bolita" (Jalisco).
The plant is employed as a dye; the seeds are said to be edible, with a flavor like that of walnuts.

2. **Ditaxis brandegei** (Millsp.) Rose & Standl. Contr. U. S. Nat. Herb. 16: 13. 1912.
Argithamnia brandegei Millsp. Proc. Calif. Acad. II. 2: 220. 1889.
Baja California and Sonora; type from San Gregorio, Baja California.
Shrub, 1 to 2 meters high, glabrous throughout, the stems usually purplish and glaucescent; leaves lanceolate or ovate, 2 to 7 cm. long, acute, finely serrate, long-petiolate; flowers in slender racemes.

3. **Ditaxis pringlei** (Greenm.) Pax & Hoffm. in Engl. Pflanzenreich IV. 147[vi]: 66. 1912.
Argithamnia pringlei Greenm. Proc. Amer. Acad. 41: 239. 1905.
Known only from the vicinity of the type locality, Cuernavaca, Morelos.
Shrub, 1 to 1.5 meters high; leaves orbicular to ovate, 3 to 8 cm. long, rounded to acute at apex, short-petiolate, entire or denticulate, white-tomentose beneath.

4. **Ditaxis lanceolata** (Benth.) Pax & Hoffm. in Engl. Pflanzenreich IV. 147[vi]: 71. 1912.
Serophyton lanceolatum Benth. Bot. Voy. Sulph. 52. 1844.
Argyrothamnia lanceolata Muell. Arg. Linnaea 34: 145. 1845.
Baja California and Sonora; type from Magdalena Bay, Baja California.
Slender, sparsely leafy shrub; leaves linear to lanceolate, 1.5 to 4 cm. long, entire, sericeous.

5. **Ditaxis palmeri** (S. Wats.) Pax & Hoffm. in Engl. Pflanzenreich IV. 147[vi]: 64. 1912.
Argithamnia palmeri S. Wats. Proc. Amer. Acad. 24: 77. 1889.
Known only from the type locality, Guaymas, Sonora.
Slender shrub; leaves mostly lanceolate, 3 to 6 cm. long, long-acuminate, entire or nearly so, short-petiolate, green, nearly glabrous.

6. **Ditaxis guatemalensis** (Muell. Arg.) Pax & Hoffm. in Engl. Pflanzenreich IV. 147[vi]: 59. 1912.
Argyrothamnia guatemalensis Muell. Arg. Linnaea 34: 145. 1865.
Jalisco to Guerrero and Puebla. Type from Guatemala.
Shrub, about a meter high; leaves ovate to ovate-oval, 1.5 to 7 cm. long, acute or acuminate, short-petiolate, sericeous, serrulate.

7. **Ditaxis sericophylla** (A. Gray) Heller, Cat. N. Amer. Pl. 5. 1900.

Argithamnia sericophylla A. Gray in S. Wats. Bot. Calif. **2**: 70. 1880.

Baja California and Sonora. Southern Arizona and California; type from Arizona.

Low shrub, sparsely leafy; leaves 1 to 3.5 cm. long, entire, short-petiolate or sessile, sericeous.

8. **Ditaxis manzanilloana** (Rose) Pax & Hoffm. in Engl. Pflanzenreich IV. **147**^{vi}: 59. 1912.

Argithamnia manzanilloana Rose, Contr. U .S. Nat. Herb. **1**: 357. 1895.

Known only from the type locality, Manzanillo, Colima.

Slender shrub; leaves ovate, 4 to 5 cm. long, acuminate, short-petiolate, green, thinly sericeous, entire or denticulate.

9. **Ditaxis tinctoria** (Millsp.) Pax & Hoffm. in Engl. Pflanzenreich IV. **147**^{vi}: 59. 1918.

Argithamnia tinctoria Millsp. Field Mus. Bot. **1**: 302. *pl. 14*. 1896.

Type from Xcholac, Yucatán. Nicaragua.

Shrub, 1.3 meters high; leaves ovate-lanceolate, 4 to 6 cm. long, acuminate, nearly entire, short-petiolate, densely pilose beneath. "Azafrán."

The plant is employed as a dye.

10. CHIROPETALUM Juss. Ann. Sci. Nat. I. **25**: 21. 1832.

1. **Chiropetalum schiedeanum** (Muell. Arg.) Pax in Engl. & Prantl, Pflanzenfam. **3**^{5}: 45. 1890.

Argyrothamnia schiedeana Muell. Arg. Linnaea **34**: 150. 1865.

Nuevo León to Veracruz and Hidalgo; type from Cerro Colorado.

Slender shrub, 1 meter high or less, or more often, perhaps, herbaceous; leaves alternate, slender-petiolate, narrowly or broadly ovate, 1.5 to 6 cm. long, acute or acuminate, serrulate, stellate-pubescent, at least when young; flowers monoecious, in slender axillary racemes; capsule deeply 3-lobate.

11. RICINUS L. Sp. Pl. 1007. 1753.

1. **Ricinus communis** L. Sp. Pl. 1007. 1753.

Common in cultivation in Mexico, and naturalized in some localities. Native probably of tropical Africa, but now widely dispersed in tropical regions.

Essentially an annual plant, but often shrublike, and sometimes becoming treelike and 9 meters high or even larger, glabrous, glaucous; leaves alternate, large, palmately lobate, the lobes acuminate, dentate; flowers monoecious, apetalous, large, racemose; fruit a large, smooth or echinate capsule. Commonly known as "higuerilla"; "palma christi" (Oaxaca); "yaga-bilape," "yaga-higo" (Oaxaca, Zapotec, *Reko*); "yutnu-nduchidzaha" (Oaxaca, Mixtec, *Reko*); "degha" (Otomí); "koch" (Maya); "tlapatl," "higuera infernal" (*Nueva Farmacopea Mexicana*).

The castor-bean is cultivated to some extent in Mexico for its seeds, which are an important source of oil. This ("aceite de castor") is well known and much used in medicine because of its purgative properties. It is widely employed as a lubricant, and has been used for illuminating purposes, in the manufacture of soap, for the manufacture of the Turkey-red oil required in the dyeing and printing of cotton goods, and for dressing tanned hides. In India and China silkworms are fed on the leaves, and the stems have been used for making paper. The ground seeds from which the oil has been extracted afford a valuable fertilizer.

The Indians of Ecuador string the seeds on sticks and burn them like candles. The decoction of the root has been used in the West Indies as a remedy for colic, and that of the leaves for venereal diseases, while the leaves are applied to the head in cases of fever to alleviate pain. The value of the scalded leaves, applied externally, as a powerful galactogogue has long been known. The castor-bean has been in use since ancient times, being known to the Egyptians at least 4,000 years ago, and it is mentioned by the early Greek writers. Most of the seeds of commerce are grown in India. During the European war their production upon a large scale was attempted in the southern United States, but with most unsatisfactory results.

12. DALECHAMPIA L. Sp. Pl. 1054. 1753.

Shrubs, or sometimes almost wholly herbaceous, erect or scandent; leaves alternate, stipulate, petiolate, entire, parted, or lobate; flowers monoecious, apetalous, borne inside a large foliaceous involucre; fruit a small capsule.

Plants erect; leaves pinnately nerved.
- Style column dilated at apex; leaves coriaceous_____1. D. spathulata.
- Style column not dilated at apex; leaves membranaceous___2. D. roezliana.

Plants scandent; leaves palmately nerved.
- Leaves mostly composed of 3 distinct leaflets_____3. D. triphylla.
- Leaves merely lobed, or entire.
  - Leaves mostly lobed; bracts usually 1.5 to 2.5 cm. long____4. D. scandens.
  - Leaves entire; bracts 0.6 to 1.2 cm. long_____5. D. schottii.

1. **Dalechampia spathulata** (Scheidw.) Baill. Etud. Gén. Euphorb. 487. *pl. 3. f. 16–30.* 1858.

Cremophyllum spathulatum Scheidw. Bull. Acad. Sci. Brux. 9[1]: 23. 1842.

Reported from Tabasco. Described from cultivated plants.

Leaves spatulate, entire, cuspidate-acuminate, glabrous.

2. **Dalechampia roezliana** Muell. Arg. in DC. Prodr. 15[2]: 1233. 1866.

Type from Zontecomapan, Veracruz. Guatemala.

Low shrub, usually unbranched; leaves oblanceolate, 15 to 30 cm. long, 4 to 8 cm. wide, acuminate, glabrous, entire or dentate.

3. **Dalechampia triphylla** Lam. Encycl. 2: 258. 1786.

Veracruz and Tabasco. Central America and South America.

Plants scandent, suffrutescent; leaves mostly 3-foliolate, but some of them usually simple, entire or dentate.

4. **Dalechampia scandens** L. Sp. Pl. 1054. 1753.

Chihuahua and Sonora to Guerrero, Veracruz, and Yucatán. Widely distributed in tropical America, with forms in Africa and the East Indies.

Scandent shrub, or sometimes herbaceous, usually with some stinging hairs; leaves mostly 3-lobate, pubescent, cordate at base; bracts large and whitish. "Xmool-coh" (Yucatán, Maya, *Seler;* "puma-foot," the calyx lobes closing like claws after the capsule opens); "ortiga" (Nicaragua); "ortiguilla" (Costa Rica).

In Costa Rica the leaves are rubbed upon the cheeks as a remedy for toothache.

Some of the Madagascar species of *Dalechampia* furnish a black dye, and are used by the natives to blacken their teeth.

5. **Dalechampia schottii** Greenm. Field Mus. Bot. 2: 255. 1907.

Yucatán; type from Mérida.

Leaves 2 to 7.5 cm. long, ovate or broadly ovate, rounded to acuminate at apex.

13. TRAGIA L. Sp. Pl. 980. 1753.

Plants scandent or erect, suffrutescent or herbaceous, the pubescence partly of stinging hairs; leaves alternate, more or less cordate at base, variously dentate; flowers small, apetalous, racemose; fruit a 3-lobate capsule.

Several herbaceous species occur in Mexico. The species listed below scarcely deserve to be classified as shrubs.

Racemes bifurcate.
- Leaves about 16 cm. wide, deeply cordate at base; pistillate flowers on short stout pedicels ..... **1. T. bailloniana.**
- Leaves 3 to 7 cm. wide, truncate or shallowly cordate at base; pistillate flowers on very long, slender pedicels ..... **2. T. volubilis.**

Racemes simple.
- Leaves entire or shallowly crenate, with a broad shallow sinus at base. **3. T. mexicana.**
- Leaves conspicuously dentate, with a deep, narrow or closed sinus at base. **4. T. affinis.**

1. **Tragia bailloniana** Muell. Arg. Linnaea **34**: 178. 1865–66.

Known only from the type locality, Teapa, Tabasco.

Plants scandent, pilose; leaves 20 cm. long, acuminate.

2. **Tragia volubilis** L. Sp. Pl. 980. 1753.

Veracruz. Central America, West Indies, South America, and tropical Africa and Asia.

Suffrutescent, scandent, copiously pubescent; leaves conspicuously dentate or serrate. "Pringa-moza" (Nicaragua, Porto Rico).

Reputed to have diuretic and sudorific properties; used in the West Indies for venereal diseases. Grosourdy states that the juice, mixed with salt, was sometimes applied to ulcers.

3. **Tragia mexicana** Muell. Arg. Linnaea **34**: 182. 1865–66.

Type from Hacienda de Jovo, in southern Mexico. Guatemala.

Scandent; leaves oblong-ovate, 6 to 17 cm. long, 3 to 7 cm. wide, acuminate; capsule densely hispid.

4. **Tragia affinis** Robins. & Greenm. Proc. Amer. Acad. **29**: 393. 1894.

Jalisco to Morelos; type collected near Guadalajara, Jalisco.

Scandent, copiously pubescent; leaves 5 to 11 cm. long, acute.

14. ACALYPHA L. Sp. Pl. 1003. 1753.

Reference: Mueller von Argau in DC. Prodr. **15**^{2}: 799–889. 1866.

Shrubs; leaves alternate, usually ovate, variously toothed, 3 or 5-nerved or pinnate-veined; staminate flowers glomerate, in slender spikes, the calyx 4-parted; pistillate flowers 1 or more subtended by a foliaceous bract, the bracts usually in ament-like spikes, the calyx of 3 or 4 sepals; fruit a 3-celled capsule.

A large number of herbaceous species occur in Mexico. *Acalypha wilkesiana* Muell. Arg., a shrub native of the islands of the Pacific, is sometimes grown in Mexico for ornament. It has large glossy green leaves, variously bordered or mottled with pink or red.

Pistillate flowers long-pedicellate.
- Stipules ovate-lanceolate ..... **1. A. flagellata.**
- Stipules subulate.
  - Pistillate inflorescence 1 or 2-flowered ..... **2. A. coryloides.**

Pistillate inflorescence many-flowered.
Leaves cuspidate-acuminate, long-petiolate_____3. A. schlechtendaliana.
Leaves acute or obtuse, short-petiolate_____4. A. longipes.
Pistillate flowers sessile.
Staminate spikes without pistillate flowers, terminal__5. A. longestipularis.
Staminate spikes with pistillate flowers at base or, if wholly staminate, axillary.
Pistillate spikes, at least the well-developed ones, with staminate flowers above or, if not so, the bracts divided into subulate lobes, these ciliate with long gland-tipped hairs.
Bracts shallowly lobate or dentate.
Bracts glandular-pubescent.
Teeth of the bracts 9 to 13_____32. A. langiana.
Teeth 17 to 21_____6. A. cuspidata.
Bracts without glandular pubescence.
Pistillate bracts minutely 1 to 4-dentate; leaves glabrate, mostly 6 to 18 cm. long_____7. A. diversifolia.
Pistillate bracts with about 9 short teeth; leaves densely pubescent, 2.5 to 3.5 cm. long_____8. A. schlumbergeri.
Bracts divided into long subulate lobes, these ciliate with long gland-tipped hairs.
Pistillate spikes elongate_____9. A. glandulifera.
Pistillate spikes subcapitate_____10. A. arvensis.
Pistillate spikes without staminate flowers above, the bracts never with subulate and glandular-ciliate lobes.
A. Pistillate spikes all axillary.
Pistillate bracts lobed or cleft to below the middle.
Bracts 3-lobed_____11. A. seleriana.
Bracts 9 to 17-lobed.
Lobes of the bracts subulate-linear_____12. A. trachyloba.
Lobes of the bracts lanceolate or broader.
Pistillate spikes subsessile_____13. A. melochiaefolia.
Pistillate spikes slender-pedunculate.
Bracts 9 to 11-lobed_____14. A. unibracteata.
Bracts 13 to 17-lobed_____15. A. leptopoda.
Pistillate bracts lobed to the middle or less deeply.
Fertile spikes all or mostly 8 to 15 cm. long, the bracts very numerous.
Stipules lanceolate_____16. A. macrostachya.
Stipules setaceous.
Leaves serrate with somewhat spreading teeth; bracts shallowly dentate_____17. A. macrostachyoides.
Leaves with appressed and incurved teeth; bracts deeply dentate_____18. A. flavescens.
Fertile spikes 1 to 5 cm. long, rarely longer, with comparatively few bracts.
Pistillate inflorescense consisting of a single subsessile bract. 19. A. rafaelensis.
Pistillate infloresence with several bracts or, if of a single bract, this long-pedunculate.
Bracts without glandular pubescence.
Teeth of the bracts acuminate_____20. A. leptoclada.

Teeth of the bracts obtuse or acutish.
Bracts glabrous or nearly so; leaves soon glabrate.
Bracts about 5-dentate; leaves 7 to 10 cm. long. 21. **A. oligantha.**
Bracts 11 to 15-dentate; leaves mostly 3 to 5 cm. long. 22. **A. acapulcensis.**
Bracts densely pubescent; leaves finely pubescent beneath. 23. **A. dioica.**
Bracts glandular-pubescent.
Bracts coarsely dentate, with 17 to 25 teeth. 24. **A. comonduana.**
Bracts minutely dentate.
Leaves obtuse, 1 to 3 cm. long, densely pilose beneath. 25. **A. californica.**
Leaves acute or acuminate, mostly 3 to 7 mm. long, green beneath and short-pilose 26. **A. umbrosa.**
AA. Pistillate spikes terminal, some of them also axillary.
Bracts lobed to the middle or more deeply.
Bracts with a few short subappressed hairs, not ciliate. 27. **A. papillosa.**
Bracts densely pilose or at least pilose-ciliate.
Bracts glandular-ciliate 28. **A. ocymoides.**
Bracts not glandular-ciliate.
Lateral lobes of the bracts truncate 29. **A. triloba.**
Lateral lobes of the bracts acuminate 30. **A. fournieri.**
Bracts lobed one-fourth the distance to the base or less.
Stems glandular-pubescent.
Bracts 17 to 21-dentate 31. **A. adenostachya.**
Bracts 7 to 13-dentate.
Leaves acute or acuminate 32. **A. langiana.**
Leaves rounded or very obtuse at apex 33. **A. pringlei.**
Stems without glandular pubescence.
Leaf blades 1 cm. long or smaller 34. **A. parvifolia.**
Leaf blades more than 2 cm. long.
Leaves glabrous or nearly so.
Bracts glabrous except for the gland-tipped hairs on the margins; leaves long-petiolate 35. **A. deppeana.**
Bracts glandular-pubescent on the sides as well as on the margins; leaves short-petiolate.
Bracts 7 or 9-dentate 36. **A. lignosa.**
Bracts 3 or 5-dentate 37. **A. laxiflora.**
Leaves copiously pubescent beneath.
Bracts 17 to 21-dentate.
Leaves lance-ovate, obtusely serrate 38. **A. vagans.**
Leaves broadly ovate, acutely serrate 39. **A. lagascana.**
Bracts 5 to 13-dentate.
Ovary muricate.
Leaves 2 to 4.5 cm. long; petioles less than half as long as the blades 40. **A. liebmanni.**
Leaves 8 to 17 cm. long; petioles usually more than half as long as the blades.
Leaf blades with a pale distinct margin beneath. 41. **A. cincta.**
Leaf blades not marginate 42. **A. schiedeana.**

Ovary smooth.
Bracts 5 to 7-dentate_____43. **A. oligodonta.**
Bracts 9 to 15-dentate.
Leaves cuspidate-acuminate_____44. **A. mollis.**
Leaves short-acuminate.
Teeth of the bracts acute; leaves serrate.
45. **A. lindeniana.**
Teeth of the bracts obtuse; leaves crenate.
46. **A. frederici.**

1. **Acalypha flagellata** Millsp. Field Mus. Bot. **2**: 417. 1916.

Yucatán; type from Buenavista Xbac.

Dioecious shrub, 2 to 5 meters high, glabrous or nearly so; leaves ovate, about 12 cm. long and 7.5 cm wide, acuminate, crenate-dentate; spikes 15 to 35 cm. long; capsule tuberculate.

2. **Acalypha coryloides** Rose, Contr. U. S. Nat. Herb. **1**: 357. 1895.

Colima; type from Manzanillo.

Shrub, 1 to 2 meters high, with grayish branches, leaves ovate or oblong-ovate, 2 cm. long or less, very short-petiolate, crenate; staminate spikes very dense, 6 to 12 mm. long; capsule muricate.

3. **Acalypha schlechtendaliana** Muell. Arg. Linnaea **34**: 6. 1865.

Linostachys padifolia Schlecht. Linnaea **19**: 235. 1845. Not *Acalypha padifolia* H. B. K. 1817.

Veracruz and Chiapas. Guatemala to Costa Rica.

Slender shrub, nearly glabrous; leaves oblong-ovate, obovate, or lance-elliptic, 8 to 18 cm. long, crenate-serrate; pistillate inflorescence loosely paniculate; staminate spikes long and slender; capsule muricate.

Mueller described[1] a var. *mollis* (from Veracruz), in which the leaves are thinly pilose beneath. It seems to differ from the typical form only in pubescence.

4. **Acalypha longipes** S. Wats. Proc. Amer. Acad. **26**: 149. 1891.

San Luis Potosí; type from Tamasopo Canyon.

Slender shrub, glabrous or nearly so; leaves oblong-ovate or ovate-elliptic, 5 to 13 cm. long, serrate; pistillate inflorescence laxly paniculate; staminate spikes lax, 7 to 12 cm. long; ovary muricate.

5. **Acalypha longestipularis** Muell. Arg. Linnaea **34**: 51. 1865.

Known only from the type locality, near Oaxaca.

Stipules setaceous, 10 to 12 mm. long; leaves lance-rhombic, 11 to 14 cm. long, 4.5 to 6 cm. wide, acuminate, tomentulose beneath, pubescent above, serrulate; ovary sericeous-hispid.

6. **Acalypha cuspidata** Jacq. Pl. Hort. Schönbr. **2**: 63. *pl. 243*. 1797.

Oaxaca and perhaps elsewhere. West Indies and South America.

Slender shrub; leaves ovate, 6 to 14 cm. long, acuminate or long-acuminate. crenate or serrate, pubescent; spikes usually little longer than the petioles; ovary hirtellous.

7. **Acalypha diversifolia** Jacq. Pl. Hort. Schönbr. **2**: 63. *pl. 244*. 1797.

Tamaulipas, Veracruz, and Oaxaca. Central America and South America.

Shrub, 1 to 3 meters high; leaves lance-ovate to broadly ovate, 5 to 18 cm. long, acuminate or cuspidate-acuminate, serrate or serrulate, glabrate or pubescent beneath; spikes mostly sessile, solitary or fasciculate, 3 to 10 cm. long, dense; ovary hispidulous, tuberculate.

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[1] Linnaea **34**: 159. 1865.

8. **Acalypha schlumbergeri** Muell. Arg. in DC. Prodr. **15**[2]: 861. 1866.

Described from southern or central Mexico, the locality not known.

Shrub, densely soft-pubescent; leaves ovate or lance-ovate, acute, crenate-serrate; spikes longer than the leaves; ovary hispid.

9. **Acalypha glandulifera** Robins. & Greenm. Amer. Journ. Sci. **50**: 164. 1895.

Oaxaca; type from Sierra de San Felipe.

Shrub, 1.5 to 2.5 meters high; leaves ovate or broadly ovate, cordate at base, 5 to 12 cm. long, cuspidate-acuminate, crenate or serrate-dentate, pubescent, especially beneath, long-petiolate; staminate spikes, 5 to 10 cm. long; ovary hispid.

10. **Acalypha arvensis** Poepp. & Endl. Nov. Gen. & Sp. **3**: 21. 1845.

Acalypha pavoniana Muell. Arg. Linnaea **34**: 50. 1865.

Acalypha capitellata T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 183. 1915.

Veracruz and Oaxaca. Central America to Peru; type from Peru.

Slender shrub; leaves lanceolate to broadly ovate, 3 to 10 cm. long, acuminate, serrate or crenate, pubescent or glabrate; pistillate heads long-pedunculate; capsule hirsute.

11. **Acalypha seleriana** Greenm. Field Mus. Bot. **2**: 254. 1907.

Yucatán; type from Xkombec.

Shrub, 1 to 2.5 meters high; leaves ovate to oblong-lanceolate, 2.5 to 5 cm. long, acute or obtuse, dentate or crenate-dentate, pubescent at first but soon glabrate; ovary muricate-hispid.

12. **Acalypha trachyloba** Muell. Arg. Flora **1872**: 25. 1872.

Known only from the type locality, near Oaxaca.

Shrub; leaves broadly ovate, 5 to 7 cm. long, cuspidate-acuminate, serrate-dentate, pubescent, especially beneath; staminate spikes 6 to 9 cm. long; pistillate spikes pedunculate.

13. **Acalypha melochiaefolia** Muell. Arg. in DC. Prodr. **15**[2]: 821. 1866.

Known only from the type locality, Hacienda Perado, near Orizaba.

Leaves triangular-ovate, 4 to 5 cm. long, crenate-serrate, velutinous; pistillate spikes 1.5 cm. long.

14. **Acalypha unibracteata** Muell. Arg. Linnaea **34**: 160. 1865.

Veracruz to Yucatán and Chiapas; type collected between Mirador and Jalapa, Veracruz. Guatemala.

Shrub, 1.5 to 3 meters high, with reddish brown branches; leaves ovate or lance-ovate, 2 to 7 cm. long, acute to long-acuminate serrate-dentate, pubescent or glabrate; pistillate bracts 1 or 2; staminate spikes 1 to 2 cm. long. "Chilibtux" (Yucatán, Maya).

15. **Acalypha leptopoda** Muell. Arg. Linnaea **34**: 39. 1865.

Veracruz. Guatemala to Costa Rica.

Slender shrub; leaves ovate, 4 to 12 cm. long, cuspidate-acuminate, serrate, densely pubescent or glabrate; pistillate bracts usually 1 or 2; staminate spikes 1.5 to 6 cm. long; ovary puberulent.

The typical form (*A. leptopoda glabrescens* Muell. Arg. in DC. Prodr. **15**[2]: 824. 1866) has glabrate leaves. *A. leptopoda mollis* Muell. Arg. (loc. cit.) is a form with densely pubescent leaves.

16. **Acalypha macrostachya** Jacq. Pl. Hort. Schönbr. **2**: 63. *pl. 245*. 1797.

Veracruz, Oaxaca, and Chiapas. Central America and South America.

Shrub, 1 to 3 meters high, leaves broadly ovate, 10 to 20 cm. long, cuspidate-acuminate, serrate, densely pubescent or glabrate; ovary hispidulous. "Chichicaste" (Guatemala).

17. Acalypha macrostachyoides Muell. Arg. in DC. Prodr. 15²: 809. 1866.

Veracruz.

Shrub, 2.5 to 4.5 meters high; leaves broadly ovate, 8 to 13 cm. long, acuminate, serrate, densely velvety-pubescent; pistillate spikes often longer than the leaves; ovary smooth, hispidulous.

18. Acalypha flavescens S. Wats. Proc. Amer. Acad. 26: 149. 1891.

Known only from the type locality, Tamasopo Canyon, San Luis Potosí.

Shrub, 1.5 to 3 meters high; leaves ovate, 7 to 16 cm. long, long-pedunculate, cuspidate-acuminate, finely velutinous beneath; bracts about 7-dentate; ovary densely pubescent.

19. Acalypha rafaelensis Standl., sp. nov.

Type from Agua del Medio, Minas de San Rafael, San Luis Potosí (*Purpus* 5478; U. S. Nat. Herb. no. 463984).

Slender shrub, the branches brownish, densely pilose when young; stipules setaceous, 6 to 10 mm. long; petioles 1.2 to 2.5 cm. long, slender or stout; leaf blades ovate or lance-ovate, 5 to 10 cm. long, 2.5 to 4.5 cm. wide, acuminate, rounded or subcordate at base, short-hispid above, densely pilose beneath; pistillate inflorescences axillary, each consisting of a single subsessile bract; bracts reniform, about 5 mm. long and 11 mm. broad, 15-dentate, densely pilose, the teeth triangular-ovate, acute; ovary smooth, densely white-hispid, the styles with numerous dark red branches.

No other Mexican species has a pistillate inflorescence like that of the present plant. In a few species it is reduced to a single bract, but in those cases the bract is borne on a long slender peduncle.

20. Acalypha leptoclada Benth. Bot. Voy. Sulph. 164. 1844.

Known only from the type locality, between San Blas and Tepic.

Leaves ovate-lanceolate, 5 to 7 cm. long, acuminate, coarsely dentate, pubescent; spikes about as long as the petioles; ovary hispid.

21. Acalypha oligantha Muell. Arg. Linnaea 34: 159. 1865.

Known only from the original localities, Santa María Tlapacoyo and Paso del Correo, banks of the Río Tecolata, Veracruz.

Leaves lance-elliptic, 7 to 10 cm. long, acuminate, appressed-denticulate, soon glabrate; staminate spikes slightly shorter than the leaves; pistillate spikes scarcely equaling the petiole; ovary smooth, puberulent.

22. Acalypha acapulcensis Fernald, Proc. Amer. Acad. 33: 87. 1897.

Known only from the type locality, Acapulco, Guerrero.

Very slender shrub with dark brown branches; leaves ovate or lance-ovate, 2 to 5 cm. long, long-acuminate, crenate-dentate, glabrate; staminate spikes 2 cm. long or less; pistillate spikes sessile, 2 to 4 cm. long; capsule hispid.

23. Acalypha dioica S. Wats. Proc. Amer. Acad. 25: 162. 1890.

Known only from the type locality, near Monterrey, Nuevo León.

Stems suffrutescent, 30 to 60 cm. high; leaves lance-ovate, 3 to 6 cm. long, acuminate, crenate-serrate, pubescent; staminate spikes long-pedunculate, about equaling the leaves; pistillate spikes lax, with 3 to 8 bracts; capsule pubescent.

24. Acalypha comonduana Millsp. Proc. Calif. Acad. II. 2: 222. 1889.

Baja California; type from Comondú.

Slender shrub; leaves broadly ovate, 5 to 11 cm. long, acute or acuminate, crenate-dentate, pubescent or glabrate; pistillate spikes equaling or longer than the petioles, the bracts distant.

25. **Acalypha californica** Benth. Bot. Voy. Sulph. 51. 1844.

Baja California and northwestern Sonora; type from Magdalena Bay, Baja California.

Slender shrub; leaves broadly ovate, obtuse or acute, crenate-dentate, densely pubescent; staminate spikes 1 to 2.5 cm. long; pistillate spikes 2 cm. long or less; ovary muricate.

26. **Acalypha umbrosa** T. S. Brandeg. Erythea **7**: 7. 1899.

Baja California; type from Socorro Island.

Leaves ovate or lance-ovate, acuminate, crenate-serrate, glandular-pubescent, long-petiolate; staminate spikes pedunculate, equaling or shorter than the leaves.

27. **Acalypha papillosa** Rose, Contr. U. S. Nat. Herb. **1**: 358. 1895.

Known only from the type locality, Agiabampo, Sonora.

Shrub, 1.5 to 2 meters high, nearly glabrous; leaves deltoid-ovate, 5 to 11 cm. long, cuspidate-acuminate, crenate-serrate; pistillate spikes all terminal, few-bracted; capsule hispid.

28. **Acalypha ocymoides** H. B. K. Nov. Gen. & Sp. **2**: 93. 1817.

Known only from the type locality, Volcán de Jorullo, Michoacán.

Leaves ovate, 8 cm. long, acuminate, coarsely serrate, appressed-pilosulous beneath; staminate spikes 4 to 6 cm. long; pistillate spikes 10 to 20 cm. long; ovary hirtellous and muricate.

29. **Acalypha triloba** Muell. Arg. Linnaea **34**: 23. 1865.

Described from Mexico, the locality not known.

Stems hispid; leaves ovate, 5 to 8 cm. long, acuminate, serrulate, hispid; pistillate spikes 5 to 9 cm. long; ovary muricate, hirsute.

30. **Acalypha fournieri** Muell. Arg. Linnaea **34**: 162. 1865.

Colima, Jalisco, San Luis Potosí, and Veracruz; type from San Luis Potosí.

Shrub; leaves broadly ovate to lance-oblong, 2 to 6 cm. long, acute or acuminate, crenate-serrate, densely pilose beneath; pistillate spikes very dense; ovary muricate and hispid.

31. **Acalypha adenostachya** Muell. Arg. Linnaea **34**: 21. 1865.

Acalypha subviscida S. Wats. Proc. Amer. Acad. **21**: 440. 1886.

Sonora and Chihuahua to San Luis Potosí, Morelos, and Guerrero.

Stems woody or suffruticose, 0.5 to 1.5 meters high, viscid-pubescent; leaves ovate or lanceolate, 3 to 11 cm. long, acuminate, serrate or crenate-serrate, viscid-pubescent beneath; staminate spikes long and slender, pedunculate; ovary muricate and glandular-pubescent. "Hierba del cáncer" (Sinaloa).

The plant is used in Sinaloa as a remedy for wounds.

32. **Acalypha langiana** Muell. Arg. Linnaea **34**: 159. 1865.

Sinaloa to Querétaro and Oaxaca; type from Cuilapa, Oaxaca. Guatemala.

Stems suffruticose, a meter high or less, viscid-pubescent; leaves ovate or broadly ovate, 2 to 8 cm. long, crenate-serrate or dentate, viscid-pubescent, rarely glabrate; spikes usually very numerous and dense; ovary muricate. "Hierba del cáncer" (Puebla).

33. **Acalypha pringlei** S. Wats. Proc. Amer. Acad. **20**: 373. 1885.

Known only from the shores of the Gulf of California, northwestern Sonora, the type locality.

Low shrub; leaves broadly ovate, 2 to 3.5 cm. long, crenate-dentate, viscid-pubescent; staminate spikes pedunculate; pistillate spikes short, few-flowered; bracts 7 to 11-dentate.

34. **Acalypha parvifolia** Muell. Arg. Linnaea **34**: 161. 1865.

Known only from the type locality, San Agustín, Oaxaca.

Shrub, about 30 cm. high, intricately branched; leaves triangular-ovate, acute, denticulate; staminate spikes pedunculate, 1 to 2 cm. long; pistillate spikes 12 to 17 mm. long; bracts acutely 9 or 11-dentate; ovary muricate.

35. **Acalypha deppeana** Schlecht. Linnaea **7**: 385. 1832.

Acalypha schiedeana Muell. Arg. Linnaea **34**: 20. 1865.

Veracruz; type from Plan del Río.

Slender shrub, glabrous or nearly so; leaves broadly ovate to oblong-ovate, 5 to 11 cm. long, crenate-serrate, cuspidate-acuminate; pistillate spikes all terminal, dense.

36. **Acalypha lignosa** T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 184. 1915.

Known only from the type locality, San Gerónimo, Oaxaca.

Shrub, nearly glabrous; leaves ovate, 6.5 cm. long, acuminate, crenate-dentate; pistillate spikes about 2 cm. long, dense; ovary hirsute.

37. **Acalypha laxiflora** Muell. Arg. Linnaea **34**: 18. 1865.

Type from Veracruz. Also in Cuba.

Leaves ovate, 7 to 10 cm. long, acutely acuminate, appressed-serrate, glabrous or nearly so; spikes about 8 cm. long; ovary sericeous.

38. **Acalypha vagans** Cav. Icon. Pl. **6**: 47. *pl. 569. f. 1.* 1801.

Jalisco and Michoacán to Chiapas and Veracruz; type from Acapulco.

Stems suffruticose, pubescent; leaves 4 to 7 cm. long, acuminate, long-pedunculate, pubescent beneath or rarely glabrate; spikes equaling or shorter than the leaves; ovary muricate, hirsute.

39. **Acalypha lagascana** Muell. Arg. Flora **1872**: 27. 1872.

Described from Mexico, the locality not known.

Leaves 3.5 to 4.5 cm. long, acuminate, villosulous beneath; staminate spikes 4 to 5 cm. long; ovary muricate, hirtellous.

40. **Acalypha liebmanni** Muell. Arg. Linnaea **34**: 161. 1865.

Known only from the type locality, Colipa, Veracruz.

Stems suffruticose, puberulent; leaves triangular-ovate, 2 to 4.5 cm. long, shortly cuspidate-acuminate, serrate; pistillate spikes twice as long as the leaves or longer, about 1 cm. thick.

41. **Acalypha cincta** Muell. Arg. Linnaea **34**: 20. 1865.

Sinaloa and Jalisco to Guerrero; type from some unknown Mexican locality.

Shrub, 1 to 2 meters high; leaves ovate or rounded-ovate, 8 to 17 cm. long, cuspidate-acuminate, crenate, puberulent beneath, with a narrow, pale green border about the margin; pistillate spikes all terminal, 5 to 9 cm. long, dense.

42. **Acalypha schiedeana** Schlecht. Linnaea **7**: 384. 1832.

Veracruz; type from Jalapa. Guatemala; reported from Venezuela.

Shrub, 1 to 3 meters high; leaves broadly ovate, 5 to 10 cm. long, shortly cuspidate-acuminate, crenate-serrate, pilose beneath; pistillate spikes dense, the staminate axillary, equaling or longer than the leaves.

43. **Acalypha oligodonta** Muell. Arg. in DC. Prodr. **15**^{2}: 831. 1866.

Oaxaca and Veracruz; type from Sierra San Pedro Nolasco, Oaxaca.

Stems suffrutescent, sericeous when young; leaves triangular-ovate, 5 to 6 cm. long, acuminate, crenate, puberulent or glabrate beneath; staminate spikes about 4 cm. long.

44. Acalypha mollis H. B. K. Nov. Gen. & Sp. **2**: 94. 1817.

Acalypha microstachya Benth. Pl. Hartw. 71. 1840.

Central Mexico; type from Venta de Chalco, Mexico.

Leaves ovate or lance-ovate, cuspidate-acuminate, serrate, densely pilose; pistillate spikes elongate, very dense.

45. Acalypha lindeniana Muell. Arg. in DC. Prodr. **15**^{2}: 827. 1866.

Veracruz and Puebla; type from Puente Nacional, Veracruz.

Leaves ovate, 4 to 5 cm. long, acute or short-acuminate, serrate, densely pilose beneath; staminate spikes half as long as the leaves, pedunculate; pistillate spikes about 1.5 cm. long, lax.

46. Acalypha frederici Muell. Arg. in DC. Prodr. **15**^{2}: 828. 1866.

Veracruz; type from Orizaba.

Stems slender, 1 meter high or less, suffruticose, hirsute, leaves ovate or lance-ovate, 3 to 7 cm. long, acuminate, pilose beneath; spikes equaling or longer than the leaves.

15. BERNARDIA Adans. Fam. Pl. 2: 356. 1763.

REFERENCE: Pax in Engl. Pflanzenreich IV. 147^{vii}: 21–45. 1914.

Shrubs, the pubescence of simple or fasciculate hairs; leaves alternate, petiolate or subsessile, usually dentate; flowers small, apetalous, monoecious or dioecious, mostly in axillary spikes; fruit a 3-lobate capsule.

Leaves entire, 3 to 7 mm. long ---------- **1. B. fasciculata.**
Leaves dentate, usually much larger.
  Style branches entire. Leaves 6 to 16 cm. long ---------- **2. B. interrupta.**
  Style branches laciniate.
    Leaves small, most of them less than 2 cm. long; capsule usually less than 1 cm. wide ---------- **3. B. myricifolia.**
    Leaves large, mostly 3 to 11 cm. long; capsule 1.2 to 1.5 cm. wide.
      Leaves very scabrous on both surfaces ---------- **4. B. aspera.**
      Leaves soft-pubescent, at least beneath ---------- **5. B. mexicana.**

1. Bernardia fasciculata S. Wats. Proc. Amer. Acad. **18**: 153. 1883.

Chihuahua and Coahuila; type from mountains northeast of Monclova, Coahuila.

Shrub, bout 1.5 meters high; leaves fasciculate or alternate, spatulate, glabrate.

A doubtful plant, scarcely of this genus.

2. Bernardia interrupta (Schlecht.) Muell. Arg. Linnaea **34**: 171. 1865.

Acalypha interrupta Schlecht. Linnaea **7**: 386. 1832.

Alevea leptotaschia Baill. Étud. Gén. Euphorb. 509. 1858.

San Luis Potosí, Veracruz, and Hidalgo; type from Hacienda de la Laguna, Veracruz.

Shrub or small tree, sometimes 5 meters high; leaves conspicuously petiolate, elliptic or obovate, sinuate-dentate, sparsely stellate-pubescent or glabrate; flowers dioecious; capsule 12 mm. broad.

3. Bernardia myricifolia (Scheele) S. Wats. Bot. Calif. **2**: 70. 1880.

Tyria myricifolia Scheele, Linnaea **25**: 581. 1852.

Bernardia viridis Millsp. Proc. Calif. Acad. II. **2**: 223. 1889.

Baja California to Tamaulipas. Western Texas to southern California; type from New Braunfels, Texas.

Shrub, 1 to 3 meters high, densely branched; leaves elliptic or obovate, coarsely repand-crenate, densely tomentose beneath. "Palo de tarugo," "oreja de ratón" (Tamaulipas).

4. **Bernardia aspera** Pax & Hoffm. in Engl. Pflanzenreich IV. 147^{vii}: 24. 1914.
Tepic to Guerrero; type from Acapulco, Gurrero.
Leaves short-petiolate, ovate, ovate-oblong, or elliptic, 5.5 to 11 cm. long, acute or acutish, very rough.

5. **Bernardia mexicana** (Hook. & Arn.) Muell. Arg. Linnaea 34: 171. 1865.
Hermesia mexicana Hook & Arn. Bot. Beechey Voy. 309. 1841.
Bernardia brandegei Millsp. Proc. Calif. Acad. II. 3: 172. 1891.
San Luis Potosí to Hidalgo and Puebla. Central America and Venezuela.
Shrub, 1 to 3 meters high; leaves oblong to orbicular-ovate, acute or obtuse, coursely crenate-dentate, thick, densely tomentose beneath when young but sometimes glabrate in age; capsule densely tomentose.

16. ADELIA L. Syst. Nat. ed. 10. 1298. 1759.

Reference: Pax in Engl. Pflanzenreich IV. 147^{vii}: 64–71. 1914.
Shrubs or trees, often with spinose branchlets; leaves alternate, entire, short-petiolate; flowers small, dioecious, apetalous; fruit a 3-lobate capsule.

Leaves spatulate, 7 mm. wide or narrower ..... 1. **A. vaseyi.**
Leaves not spatulate, most of them 2 cm. wide or more.
Leaves pinnately nerved, soon glabrate beneath ..... 2. **A. barbinervis.**
Leaves 3-nerved at base, densely pubescent beneath ..... 3. **A. oaxacana.**

1. **Adelia vaseyi** (Coulter) Pax & Hoffm. in Engl. Pflanzenreich IV. 147^{vii}: 69. 1914.
Euphorbia vaseyi Coulter, Contr. U. S. Nat Herb. 1: 48. 1890.
Western Texas, the type from Brazos Santiago; collected also at Brownsville, Texas, and doubtless in Tamaulipas.
Shrub, 1 to 2 meters high; leaves 1.5 to 3 cm. long.

2. **Adelia barbinervis** Schlecht. & Cham. Linnaea 6: 362. 1831.
Tamaulipas and San Luis Potosí to Oaxaca; type from Papantla, Veracruz. Guatemala.
Shrub or small tree, sometimes 6 meters high; leaves mostly obovate, 4 to 9 cm. long, obtuse to acuminate; capsule about 1 cm. wide.

3. **Adelia oaxacana** (Muell. Arg.) Hemsl. Biol. Centr. Amer. Bot. 3: 129. 1883.
Ricinella oaxacana Muell. Arg. Linnaea 34: 154. 1865.
San Luis Potosí to Yucatán and Oaxaca.
Shrub or tree, sometimes 6 meters high; leaves obovate, ovate, or elliptic, 2 to 7 cm. long, obtuse or short-pointed, velvety-pilose; capsule 1 cm. broad. "Xtompac" (Yucatán, Maya).

17. ALCHORNEA Swartz, Prodr. Veg. Ind. Occ. 98. 1788.

Reference: Pax in Engl. Pflanzenreich IV. 147^{vii}: 220–253. 1914.

1. **Alchornea latifolia** Swartz, Prodr. Veg. Ind. Occ. 98. 1788.
Veracruz and Oaxaca. Central America and West Indies; type from Jamaica.
Tree, 8 to 20 meters high; leaves alternate, long-petiolate, ovate or elliptic, 11 to 27 cm. long, short-pointed, crenate-dentate, with minute scattered stellate hairs on the lower surface; flowers small, apetalous, dioecious, spicate; capsule 1 cm. broad. "Palo mujer," "palo de puta" (Oaxaca); "achiotillo," "palo de cotorro," "yobillo" (Porto Rico); "aguacatillo" (Santo Domingo).

DOUBTFUL SPECIES.

Alchornea similis Muell. Arg. Flora 47: 434. 1864. Type from Sierra San Pedro Nolasco. Probably synonymous with *A. latifolia.*

18. JATROPHA L. Sp. Pl. 1006. 1753.

REFERENCE: Pax in Engl. Pflanzenreich IV. 147: 21–113. 1910.

Trees or shrubs, often armed with stinging hairs; leaves alternate, usually long-petiolate, entire or palmately lobate, the stipules small or large and dissected; flowers usually monoecious, petaliferous or apetalous, usually cymose; fruit a capsule.

A few herbaceous species occur in Mexico.

Flowers apetalous; plants usually armed with stinging hairs.
- Pistillate calyx persistent as a disk at the base of the capsule.
  - Leaves repand-dentate, not lobate, 2.5 to 6.5 cm. wide ------ **1. J. palmeri.**
  - Leaves conspicuously lobate, usually more than 10 cm. wide.
    - Leaves lobed halfway to the base or less, the lobes entire or repand-denticulate ---------- **2. J. tubulosa.**
    - Leaves usually lobed more than halfway to the base, the lobes laciniate or coarsely dentate.
      - Lobes of the leaves merely dentate ---------- **3. J. multiloba.**
      - Lobes laciniate.
        - Stamen column glabrous ---------- **4. J. liebmannii.**
        - Stamen column villous at the base ---------- **5. J. polyantha.**
- Pistillate calyx caducous.
  - Calyx surrounded by a calyculus of slender-clavate hairs -- **6. J. calyculata.**
  - Calyx not calyculate.
    - Outer filaments free ---------- **7. J. urens.**
    - Outer filaments united with the others.
      - Leaves not lobed ---------- **8. J. rotundifolia.**
      - Leaves conspicuously lobate.
        - Staminodia none ---------- **9. J. kunthiana.**
        - Staminodia present, filiform.
          - Leaves lobed less than halfway to the middle -- **10. J. angustidens.**
          - Leaves lobed more than halfway to the middle - **11. J. aconitifolia.**

Flowers with petals; plants without stinging hairs.
- Petals free or nearly so.
  - Stipules reduced to sessile glands ---------- **12. J. andrieuxii.**
  - Stipules persistent, setaceous-dissected or subulate.
    - Petioles with gland-tipped hairs ---------- **13. J. gossypiifolia.**
    - Petioles without glands.
      - Leaves peltate ---------- **14. J. podagrica.**
      - Leaves not peltate.
        - Lobes of the leaves deeply lobate ---------- **15. J. multifida.**
        - Lobes of the leaves merely dentate.
          - Leaves shallowly lobate; cymes few-flowered ---- **16. J. purpurea.**
          - Leaves deeply lobate; cymes many-flowered. **17. J. longipedunculata.**
- Petals conspicuously united.
  - Cymes much reduced, the flowers mostly fasciculate.
    - Leaves sessile or very short-petiolate.
      - Stipules small, not dissected; leaves glabrous or nearly so. **18. J. spathulata.**
      - Stipules large, setose-dissected; leaves densely pubescent. **19. J. neopauciflora.**

Leaves borne on long slender petioles.
Leaves and pistillate sepals glandular-ciliate.
Staminate sepals ciliate; leaves mostly acuminate.__20. J. cordata.
Staminate sepals eciliate; leaves acutish or rounded and short-pointed_____21. J. vernicosa.
Leaves and sepals not glandular-ciliate.
Leaves pubescent on one or both surfaces_____23. J. cinerea.
Leaves glabrous on both surfaces.
Leaves broadly rounded or emarginate at apex.
Leaves acute or acuminate_____24. J. cercidiphylla.
Leaves 5 to 10.5 cm. wide, entire_____29. J. gaumeri.
Leaves 1.5 to 2.5 cm. wide, crenate_____22. J. cardiophylla.
Cymes large, much branched, broad.
Leaves conspicuously peltate_____25. J. platyphylla.
Leaves not peltate.
Teeth of the leaves ending in stipitate glands._____26. J. olivacea.
Teeth (if present) without stipitate glands.
Cymes sessile_____27. J. alamani.
Cymes pedunculate.
Leaves all or mostly entire.
Leaves obovate_____28. J. sympetala.
Leaves cordate.
Branches of the inflorescence glabrous_____29. J. gaumeri.
Branches of the inflorescence densely pilose.
30. J. yucatanensis.
Leaves, at least most of them, conspicuously lobate or angulate.
Leaves glabrous or glabrate at maturity_____31. J. curcas.
Leaves densely pubescent beneath at maturity.
Leaves densely tomentose beneath, puberulent or thinly tomentulose on the upper surface_____32. J. rufescens.
Leaves villosulous beneath, velvety-pilose on the upper surface.
33. J. pseudocurcas.

1. **Jatropha palmeri** S. Wats. Proc. Amer. Acad. **24**: 76. 1888.
Sonora and Baja California; type from Guaymas, Sonora.
Shrub; leaves long-petiolate, orbicular or flabellate, coarsely dentate, pubescent on both surfaces.

2. **Jatropha tubulosa** Muell. Arg. Linnaea **34**: 212. 1865.
Jatropha jurgensenii Briq. Ann. Cons. Jard. Genève 4: 229. 1900.
? *Jatropha tepiquensis* Cost. & Gall. Rév. Gén. Bot. **18**: 388. 1906.
Tepic(?) to Puebla and Oaxaca. Central and South America.
Shrub or small tree, armed with long stiff stinging hairs; leaves about 20 cm. wide; flowers white; capsule covered with stinging hairs. "Mala mujer" (*Pax*).

3. **Jatropha multiloba** Pax in Engl. Pflanzenreich IV. **147**: 107. 1910.
Tamaulipas and Veracruz; type from Orizaba, Veracruz.
Shrub or small tree, sometimes 3.5 meters high, with few thick branches; leaves 20 to 25 cm. wide, densely velvety-puberulent; flowers white, about 1 cm. long. "Mala mujer lisa" (Tamaulipas).

4. **Jatropha liebmannii** Muell. Arg. Linnaea **34**: 212, 1865.
Known only from the type locality, Tehuanac, Veracruz.
Leaves 3 to 7-parted, puberulent when young.

5. **Jatropha polyantha** Pax & Hoffm. in Engl. Pflanzenreich IV. **147**: 105. 1910.
Known only from the type locality, La Orilla, Michoacán.
Frutescent, the branches armed with stinging hairs; leaves about 20 cm. wide, glabrous except for stinging hairs; flowers white. "Ortiga."

6. **Jatropha calyculata** Pax & Hoffm. in Engl. Pflanzenreich IV. **147**: 97. 1910.
Known only from the type locality, La Pitirem, Michoacán or Guerrero, altitude 200 meters.
Leaves cordate, 10 to 15 cm. wide, armed with needle-shaped hairs, coarsely salient-dentate; flowers white. "Ortiga."
Said to be herbaceous, but inserted here because of its close relationship to some of the other species, most of which become shrubs at times. Roots large and fleshy, employed as a remedy for venereal diseases.

7. **Jatropha urens** L. Sp. Pl. 1007. 1753.
Jatropha herbacea L. Sp. Pl. 1007. 1753.
Tamaulipas, San Luis Potosí, Veracruz, Oaxaca, and probably elsewhere. Widely distributed in tropical America.
Shrub, 3 meters high, or often herbaceous, copiously armed with stinging hairs; leaves 12 to 30 cm. wide; flowers white, sweet-scented, about 1 cm. long; seeds grayish, 8 mm. long. "Mala mujer" (Oaxaca, San Luis Potosí, Veracruz, Tamaulipas); "chichicaste," "chichicaste de burro" (Guatemala); "guaritoto" (Venezuela); "pringamoza" (Colombia).
The hairs sting the skin painfully, and often cause sores. The thick, fleshy roots are employed locally for venereal and other diseases.

8. **Jatropha rotundifolia** Muell. Arg. Linnaea **34**: 211. 1865.
Known only from the type locality, San Luis (Potosí ?).
Leaves 4 to 6 cm. wide, deeply cordate at base, repand-dentate; flowers 7 mm. long.

9. **Jatropha kunthiana** Muell. Arg. Linnaea **34**: 211. 1865.
Veracruz. Northern South America; type from Cumaná, Venezuela.
Shrub, 1 to 1.5 meters high; leaves 12 to 25 cm. wide; flowers about 1 cm. long.

10. **Jatropha angustidens** (Torr.) Muell. Arg. in DC. Prodr. **15**^{2}: 1102. 1866.
Cnidoscolus angustidens Torr. U. S. & Mex. Bound. Bot. 198. 1859.
Baja California and Sonora to Guerrero and Tamaulipas; type from Santa Cruz, Sonora.
Herbaceous, or sometimes a shrub 1.5 meters high, densely armed with long stinging hairs; leaves 10 to 25 cm. wide, long-petiolate, with numerous spine-tipped teeth and shallow lobes; flowers white, 1 to 1.5 cm. long; seeds spotted with brown and gray, 8 to 10 mm. long. "Mala mujer," "mala mujer china" (Tamaulipas).

11. **Jatropha aconitifolia** Mill. Gard. Dict. ed. 8. *Jatropha* no. 6. 1768.
Jatropha papaya Medic. Bot. Beob. (1782) 194. 1783.
Veracruz, Oaxaca, and Yucatán. Central America.
Tree, sometimes 8 meters high; leaves 15 to 20 cm. wide; flowers white, 1 cm. long. "Chaya," "picar" (Yucatán); "quelite" (*Pax*).
Sometimes planted as a shade tree or for hedges. Cultivated plants are occasionally destitute of stinging hairs.

12. **Jatropha andrieuxii** Muell. Arg. Linnaea **34**: 208. 1865.
Type collected between Puebla and Oaxaca.
Plant densely pubescent throughout; leaves 15 cm. broad, suborbicular, shallowly lobate; petals 1.5 cm. long.

13. Jatropha gossypiifolia L. Sp. Pl. 1006. 1753.

Veracruz and perhaps elsewhere. Widely distributed in tropical America; also in western Africa (adventive ?).

Shrub, 1 to 2 meters high; leaves 10 to 15 cm. wide, 3 or 5-parted, the lobes acute; flowers purplish. "Frailecillo" (Costa Rica, Cuba, Venezuela, Colombia); "frailejón," "purga de fraile" (Colombia); "túatúa" (Venezuela, Santo Domingo, Porto Rico, Cuba); "San Juan del Cobre" (Cuba); "higuereta cimarrona" (Porto Rico).

The seeds are eaten by doves and domestic fowls. They contain much oil and have drastic purgative and emetic properties. A decoction of the leaves is employed as a blood purifier and for venereal diseases, and is administered as an emetic for pains in the stomach. The root has some repute as an antidote for snake bites and as a remedy for the poison of manchineel (*Hippomane mancinella*).

14. Jatropha podagrica Hook. in Curtis's Bot. Mag. *pl. 4376*. 1848.

Puebla, probably cultivated. Central America; cultivated in the West Indies.

Plants mostly 1 meter high or less, glabrous; leaves long-petiolate, peltate, 10 to 20 cm. long, deeply 3 or 5-lobate, the lobes broad, acute or obtuse, entire; cymes long-pedunculate, the flowers red; petals 6 to 7 mm. long; capsule 1.5 cm. long. "Ruibarbo" (El Salvador).

15. Jatropha multifida L Sp. Pl. 1006. 1753.

Reported from Veracruz, but perhaps only cultivated. Widely distributed in tropical America; naturalized in the tropics of the Old World.

Shrub or tree, sometimes 6 meters high, glabrous; leaves with numerous narrow lobes; flowers red or purplish, the petals 4 to 7 mm. long; capsule nearly 3 cm. long. "Cabalongo" (Veracruz, *Seler*); "chicaquil" (Costa Rica); "tartora," "piñón" (Venezuela); "yuca cimarrona" (Santo Domingo).

The leaves are said to be cooked sometimes as a vegetable. The yellow sap is used in Brazil in the treatment of wounds, and the roasted seeds for fevers and venereal diseases. The seeds are purgative like those of many other species.

16. Jatropha purpurea Rose & Pax in Engl. Pflanzenreich IV. **147**: 42. *f. 15*. 1910.

Dry hillsides, Sinaloa and southern Baja California; type from Agiabampo, Sonora.

Shrub, about 2.5 meters high, with thin, papery, pale brown bark; leaves slender-petiolate, 4 cm. wide or narrower, more or less 3-lobate; petals 7 to 8 mm. long.

17. Jatropha longipedunculata T. S. Brandeg. Univ. Calif. Publ. Bot. **7**: 328. 1920.

Jatropha urens longipedunculata T S. Brandeg. Univ. Calif. Publ. Bot. **6**: 368. 1917.

Veracruz; type from Zacuapan.

Shrub or small tree, 5 meters high or less, nearly glabrous; leaves long-petiolate, 12 to 27 cm. long, 3 or 5-lobate, cordate at base, the lobes acute or acuminate, coursely dentate; petals 5 mm. long; capsule about 1 cm. long.

18. Jatropha spathulata (Orteg.) Muell. Arg. in DC. Prodr. **15**^{2}: 1081. 1866.

? *Jatropha dioica* Cervant. Supl. Gac. Lit. Méx. 4. 1794.

Mozinna spathulata Orteg. Hort. Matr. Dec. 105. *pl. 13*. 1799.

Loureira cuneifolia Cav. Icon. Pl. 5: 17. *pl. 429*. 1799.

Zimapania schiedeana Engl. & Pax in Engl. & Prantl, Pflanzenfam. **3**^{5}: 119. *f. 75*. 1890.

Baja California to Tamaulipas and Puebla. Western Texas and southern Arizona.

Shrub, 0.5 to 5 meters high, with thick, succulent, reddish-brown branches; leaves usually fasciculate, 1 to 7 cm. long, linear to spatulate, entire or often 3-lobate; flowers very small, fasciculate, sessile or pedicellate; fruit usually 1-seeded. "Sangregrado" (San Luis Potosí, Sonora, Zacatecas, Durango, etc.); "sangre de drago" (Durango, Chihuahua, Nuevo León, San Luis Potosí, Hidalgo, Zacatecas, Mexico, Texas); "sangre de grado" (Durango, Coahuila); "sangregado" (*Urbina*); "tecote prieto" (Sinaloa, Sonora); "tocote prieto" (Sonora); "matacora," "torote prieto" (Baja California); "telondilla" (Distrito Federal); "drago" (Texas, Tamaulipas); "piñón del cerro" (Oaxaca, *Villada*); "torote amarillo" (Sonora); "coatli" (*Sahagún*); "tlapalezpatli" (*Hernández*).

The stems are flexible and tough; they are useful for whips and withes, and have been used for making baskets. The bark is used for tanning and dyeing, and has been exported for those purposes. It gives a dark red dye, but is said to be injurious to cloth. The juice has astringent properties and is used in domestic medicine for hardening the gums, for skin eruptions, sores, dysentery, hemorrhoids, and venereal diseases, to prepare a gargle for sore throat, as a wash to restore and give luster to the hair, and to remove stains from the teeth. The roots are chewed to relieve toothache.

The species exhibits great variation in the form of the leaves, even upon a single plant.

19. **Jatropha neopauciflora** Pax in Engl. Pflanzenreich IV. **147**: 134. 1910.

Mozinna pauciflora Rose, Contr. U. S. Nat. Herb. **12**: 282. *pl. 22.* 1909.

Jatropha pauciflora Pax in Engl. Pflanzenreich IV. **147**: 82. 1910.

Puebla; type from Tehuacán.

Shrub, 3 to 4 meters high, similar to the last species; leaves usually larger, usually 1.5 to 3 cm. wide; seed about 1 cm. in diameter.

20. **Jatropha cordata** (Orteg.) Muell. Arg. in DC. Prodr. **15**^{2}: 1078. 1866.

Mozinna cordata Orteg. Hort. Matr. Dec. 107. 1799.

Loureira glandulosa Cav. Icon. Pl. **5**: 18. *pl. 430.* 1799.

Sonora and southern Chihuahua to Jalisco.

Shrub or small tree, 2 to 6 meters high; leaves ovate-cordate, crenate, usually not lobate, glabrous, lustrous. "Mata-muchachos" (Chihuahua); "jiotillo" (Sinaloa).

The bruised leaves are applied to sores, and they are added to water in which children are bathed, because of supposed strengthening properties. The juice is yellowish, and when dry forms a sulphur-colored powder.

21. **Jatropha vernicosa** T. S. Brandeg. Zoe **5**: 206. 1905.

Southern Baja California; type from mountains of the Cape Region.

Shrub, 2 to 4 meters high, glabrous; leaves rounded-cordate, 3 to 7 cm. wide.

Rather doubtfully distinct from *J. cordata.*

22. **Jatropha cardiophylla** (Torr.) Muell. Arg. in DC. Prodr. **15**^{2}: 1079. 1866.

Mozinna cardiophylla Torr. U. S. & Mex. Bound. Bot. 198. 1859.

Sonora. Southern Arizona; type collected near Tucson.

Low glabrous shrub. "Torote" (Sonora.)

The roots are employed for tanning. When dried they contain over five per cent of tannic acid.

23. **Jatropha cinerea** (Orteg.) Muell. Arg. in DC. Prodr. **15**^{2}: 1078. 1866.

Mozinna cinerea Orteg. Hort. Matr. Dec. 107. 1799.

Mozinna canescens Benth. Bot. Voy. Sulph. 52. *pl. 25.* 1844.

Jatropha canescens Muell. Arg. in DC. Prodr. **15**[2]: 1079. 1866.

Dry plains and hillsides, Baja California, Sonora, and Sinaloa.

Shrub or small tree, 1 to 6 meters high, with brown or whitish bark; leaves 2 to 7 cm. wide, more or less cordate at base, entire or somewhat undulate; flowers pinkish; capsule 2 to 2.5 cm. wide. "Sangregrado" (Sinaloa, Sonora); "sangre en grado" (Sonora); "lomboi" (Baja California); "torotito" (Sonora).

A decoction is employed as a mordant in dyeing. The juice is astringent and is used as a remedy for warts and sore throat, and for hardening the gums.

24. Jatropha cercidiphylla Standl., sp. nov.

Type collected between San Luis Potosí and Tampico (*Palmer* 1140; U. S. Nat. Herb. no. 42743); also in the Tres Marías Islands, Tepic.

Stipules linear-lanceolate, entire, persistent; petioles slender, 4 to 8 mm. long, inserted above the base of the blade; leaf blades orbicular to reniform, sometimes flabellate-orbicular, 1 to 2.3 cm. long, 1 to 2.7 cm. wide, broadly rounded or shallowly emarginate at apex, rounded or subcordate at base, subcoriaceous, glabrous or nearly so, glaucescent beneath, the venation conspicuous and reticulate; pistillate flowers axillary, solitary, the pedicels 1.5 to 6 cm. long; capsule glabrous, about 1 cm. long; seeds 4 to 5 mm. long, brown, rugulose.

25. Jatropha platyphylla Muell. Arg. in DC. Prodr. **15**[2]: 1077. 1866.

Sinaloa to Michoacán.

Shrub, nearly glabrous; leaves 15 to 35 cm. broad, glaucous beneath, with short rounded lobes; seeds about 12 mm. long. "Sangregrado."

Sometimes cultivated as a hedge plant.

26. Jatropha olivacea Muell. Arg. Linnaea **34**: 207. 1865.

Mexico to Oaxaca; type from San Juan del Estado, Oaxaca.

About a meter high, nearly glabrous; leaves 5 to 7 cm. long, 3 or 5-lobate; corolla about 8 mm. long.

27. Jatropha alamani[1] Muell. Arg. Linnaea **34**: 207. 1865.

Known only from the type locality, Tehuantepec, Oaxaca.

Trunk 2.5 to 3 meters high; leaves 10 cm. wide, 5-lobate, cordate at base, puberulent.

28. Jatropha sympetala Standl. & Blake, Proc. Biol. Soc. Washington **33**: 188. 1920.

Type from Playa de Coyula, Oaxaca.

Tree; leaves petiolate, obovate, 7 to 9 cm. long, rounded at apex, cuneate at base, glabrous, glaucescent beneath; cymes shorter than the leaves, hispidulous, long-pedunculate, the flowers red; corolla 8 mm. long. "Piñoncillo."

29. Jatropha gaumeri Greenm. Field Mus. Bot. **2**: 256. 1907.

Yucatán; type from Izamal.

Shrub or tree, 3 to 10 meters high, the trunk sometimes 50 cm. in diameter; leaves of medium size, broadly cordate, usually cuspidate-acuminate, glabrous or nearly so. "Pomolché."

Branches sometimes used for making whistles. This has been reported from Yucatán as *Ficus jaliscana* and as *Jacaratia mexicana*.

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[1] The species is named in honor of Lucas Alamán (1792–1853), who was born at Guanajuato. He studied under Cervantes, and traveled for some time in Europe. He forwarded notes and botanical specimens to De Candolle, and is said to have been well informed upon botanical subjects. He is best known for his literary and historical publications.

30. Jatropha yucatanensis Briq. Ann. Cons. Jard. Genève 4: 230. 1900.

Campeche and Chiapas; type from Campeche.

Tree; leaves 5 to 11.5 cm. wide, broadly cordate, pubescent beneath at first but soon glabrate; flowers green.

One collection from Puebla is closely related to this species, but may represent a distinct species. The material is too poor for certain determination.

31. Jatropha curcas L. Sp. Pl. 1006. 1753.

Sinaloa to Veracruz, Yucatán, and Chiapas. Widely distributed in tropical America; naturalized in the tropics of the Old World.

Shrub or tree, 1 to 6 meters high; leaves 6 to 35 cm. wide, shallowly 3 or 5-lobate, long-petiolate; flowers greenish yellow; capsule large, drupaceous, 2 or 3-celled; seeds about 2 cm. long. "Sangregado" or "sangregrado" (Sinaloa); "xcacal-ché," "siclte" (Yucatán, Maya); "piñoncillo" (Chiapas, Veracruz, Oaxaca); "quauhayohuatli," "quauhayohuachtli" (Nahuatl); "avellanas purgantes" (seeds), "piñón de Indias" (Veracruz, *Ramírez*); "piñón purgante" (Oaxaca); "piñón" (Guatemala, Nicaragua, Honduras, Venezuela, Santo Domingo, Porto Rico); "piñón botija" (Cuba); "coquillo" (Panama, Costa Rica); "tártago" (Porto Rico); "tempate" (Costa Rica, Nicaragua, El Salvador); "tempacte" (Guatemala); "tapate" (Costa Rica).

Known in the British West Indies as "physic-nut." Often cultivated in Mexico as a hedge plant, because the branches take root quickly when placed in the ground, and because the plant is not eaten by stock. Palmer reports that the plant gives a purple dye and is sometimes used for tanning. The wood is very soft and spongy. The seeds have an agreeable flavor and have been eaten by children, but sometimes with fatal results, for they are poisonous. They contain from 25 to 40 per cent of inodorous oil which is easily extracted by pressure. This has been employed in some regions for illuminating purposes, also for soap making, as a lubricant, and in paints. The leaves are said to be used in the Philippines for stupefying fish. In Costa Rica they are applied as poultices for eczema and other skin diseases. The seeds possess drastic purgative properties.

The plant is desribed at length by Oviedo (Lib. X, Cap. IV), who mentions the purgative properties of the seeds, which were known to the Indians who, on this account, planted the trees about their houses. He relates how his own small children in the city of Santo Domingo in 1520 ate some of the seeds and narrowly escaped death. The plant is described and figured by Hernández,[1] who says : "The *Quauhayohuachtli* is a tree of medium size, with large leaves like those of burdock, round and angled. The fruit, somewhat like plums or nuts, has three piñones contained in its cavities, in their form, size, and kernels much like the fruits of our pine, but very different in their properties. It is a powerful vomitive, and purges all kinds of humors. For chronic diseases the seeds are much used, in the quantity of five or seven; always an odd number; I do not know the reason for this injunction. They are accustomed to make their action milder by roasting them and soaking them for some time in water or wine. Their nature is hot and oily. The tree grows in hot places, such as Tepecuacuilco [Guerrero]." Sessé and Mociño state that the roasted seeds were ground and mixed with chile and tomato to make a sauce or condiment known as "pipián." Humboldt and Bonpland report that the Indians ate the seeds after removing the embryo.

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[1] Thesaurus 87–88. 1651.

An interesting account is given by Urbina[1] of axi, axin, or aje, an oily yellowish substance which is produced by a scale insect of the same name upon the branches of *Jatropha curcas*, *Spondias*, and other trees. Urbina quotes from Llave, who says:

"The *Coccus axin* was brought from Tlacotalpan in the State of Veracruz, and Dr. Schiede, a German physician, has told me that he has seen it also at Papantla. This animal lives on the bark of the plant called in the tierra caliente Piñón (*Jatropha curcas*) and on that called Jobo (*Spondias mombin*).

"We know that they cultivate these insects in Tlacotalpan, whence they have sent information regarding the conservation, propagation, and extraction of the *Axi*. The first is practiced by placing the insects, when they have reached their full development (in October or November), within corn husks filled with corn silk, which latter alone should come in contact with the insects. These bundles are stored in a place which is dry and free from ants or other insects which might injure them; and in the month of May or June, when the rains begin, they open the bundles at one end, and find within a white envelope like spider web; and then they bind the bundles to the trees destined for propagation, and in a short time the trees are covered with the new insects. The trees used are known by the vernacular names of *Jobo* and *Piñón;* and as soon as the insects find a place on the bark they remain fixed there until they are scraped off in order that the *Axi* may be extracted from them. This operation is practiced by separating the insects first from the dust which covers them; next they are put to boil in ordinary water until they disintegrate and the wax rises to the surface, whereupon they are strained in a piece of cloth in order to extract all the wax possible. This is placed in jars and left to stand 20 hours or more, when it is found to be slightly coagulated; then it is stirred until it forms small balls, which are washed and put over a slow fire to remove the moisture; afterward the wax is strained, and when cold it is in form fit for use.

"Among other uses, we know that the natives of Tlacotalpan employ this wax, melted, for varnishing pieces of crockery; and if a certain degree of heat is applied, there is obtained a sort of jelly, which, if rubbed over paintings, gives a very brilliant varnish.

"The culture of the *Axin* is a fact which confirms the favorable opinion which must be held of the ancient inhabitants of our country, for the domestication of plants and animals is always a proof of civilization."

Urbina quotes also from Herrera, who says: "The *Aje* has a consistency like butter; it is yellow, and has a peculiar odor similar to that of rancid butter. * * * The Indians used it for erysipelas and as a resolutive and vulnerary; they employed it also for the cure of hernia, mixing it with hule [crude rubber], turpentine, and arrayán; it is used for various uterine affections. In the arts it is used as an excellent varnish for wood and metals, and it is employed by the natives to varnish *jícaras*."

"Axin" is produced in many parts of Mexico. It is well known in Yucatán, where the Maya name is "ni-in." The varnish is said to be very durable, and is employed, among various uses, for varnishing guitars. Dondé states (according to Urbina, loc. cit.): "It is probable that the ancient inhabitants of the country (Yucatán) employed this oil in painting their buildings, and for this reason there are still seen, after three centuries, their decorations, whose good state of preservation aroused the admiration of Mr. Stephens, when, in 1842, he visited our ruins."

For an illustration of *Jatropha curcas* see Contr. U. S. Nat. Herb. **8**: *pl. 42*.

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[1] Naturaleza **7**: 363–365. 1902.

32. Jatropha rufescens T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 88. 1910.

Known only from the type locality, Tlacuilotepec, Puebla, altitude 1,800 to 2,100 meters.

Branches thick and succulent; leaves 6 to 10 cm. wide, shallow-lobate or merely undulate, cordate at base, bright green on the upper surface, covered beneath with a dense brownish tomentum.

33. Jatropha pseudocurcas Muell. Arg. Linnaea 34: 208. 1865.

Jalisco to Oaxaca; type from Oaxaca.

Shrub, 3 to 4.5 meters high; leaves 10 to 20 cm. wide, broadly cordate at the base, copiously pubescent; capsule 2.5 cm. long.

DOUBTFUL SPECIES.

The following, described from Mexico by Cervantes in 1794 (Supl. Gac. Lit. Méx. 3, 4), are so imperfectly characterized that their identification is altogether doubtful: *J. ciliata*, *J. edulis*, *J. octandra*, *J. palmata*, *J. quinqueloba*, *J. triloba*.

19. MANIHOT Adans. Fam. Pl. 2: 356. 1763.

REFERENCE: Pax in Engl. Pflanzenreich IV. 147 II: 21–99. 1910.

Shrubs or trees, or sometimes herbs, usually with succulent stems, often glaucescent; leaves alternate, petiolate, usually large and lobate; flowers large, monoecious, apetalous, racemose or paniculate; fruit a capsule.

Manihot glaziovii Muell. Arg. is the Ceara rubber tree, an important rubber plant of Brazil.

Bracts of the inflorescence large and foliaceous.
- Lobes of the leaves shallowly lobate ---------- 1. M. pringlei.
- Lobes of the leaves entire.
  - Calyx glabrous outside ---------- 2. M. crassisepala.
  - Calyx pubescent ---------- 3. M. foetida.

Bracts small and inconspicuous.
- Lobes of the leaves lobate.
  - Lobes of the leaves linear or lance-linear, broadest below the middle. 4. M. angustiloba.
  - Lobes of the leaves broad, dilated at apex.
    - Calyx 1 cm. long; bractlets usually absent ------ 5. M. carthaginensis.
    - Calyx 1.5 cm. long; bractlets of the pedicels linear, 5 to 10 mm. long. 6. M. intermedia.
- Lobes of the leaves entire.
  - Bracts incised-laciniate ---------- 7. M. microcarpa.
  - Bracts entire.
    - Calyx pubescent within, glabrous outside.
      - Anthers very short; ovary 6-angulate; capsule winged ---- 8. M. esculenta.
      - Anthers elongate; ovary terete; capsule not winged ------ 9. M. dulcis.
    - Calyx glabrous throughout.
      - Leaves 3-parted, the lobes truncate or emarginate ---- 10. M. pauciflora.
      - Leaves 3 to 7-lobed or parted, the lobes acutish to acuminate.
        - Lobes of the leaves lanceolate ---------- 11. M. olfersiana.
        - Lobes of the leaves rhombic or obovate.
          - Lobes rhombic, abruptly dilated above ------- 12. M. rhomboidea.
          - Lobes obovate, not abruptly dilated.
            - Lobes abruptly cuspidate-acuminate ---------- 13. M. caudata.
            - Lobes merely acuminate ---------- 14. M. aesculifolia.

1. **Manihot pringlei** S. Wats. Proc. Amer. Acad. **26**: 148. 1891.

Tamaulipas and San Luis Potosí; type from Las Canoas, San Luis Potosí.

Shrub, 2 meters high, the stems as much as 4 cm. in diameter; bark thin, brownish gray, nearly smooth; wood white, soft and fibrous; leaves 5 or 7-parted, 9 to 12 cm. long, the lobes usually lobate; flowers white, about 2 cm. long. "Matorral" (Tamaulipas).

2. **Manihot crassisepala** Pax & Hoffm. in Engl. Pflanzenreich IV. **147**[II]: 28. 1910.

Known only from the type locality, Colima.

Tree; leaves 3-lobate, glabrate; calyx 2 cm. long; seeds red.

3. **Manihot foetida** (H. B. K.) Pohl, Pl. Bras. **1**: 55. 1827.

Janipha foetida H. B. K. Nov. Gen. & Sp. **2**: 84. 1817.

Known only from the type locality, Mexicala, Guerrero.

Large tree with gray bark; leaves 3-parted, glabrous; calyx 1.3 cm. long; ovary white-tomentulose. "Ayotectli."

4. **Manihot angustiloba** (Torr.) Muell. Arg. in DC. Prodr. **15**[2]: 1073. 1866.

Janipha manihot angustiloba Torr. U. S. & Mex. Bound. Bot. 199. 1859.

Chihuahua and Sonora to Oaxaca; type from Santa Cruz, Sonora. Southern Arizona; Guatemala.

Low shrub, or often herbaceous; leaves 3 to 7-parted, the lobes 3 to 15 cm. long, usually lobate but sometimes entire; calyx about 1 cm. long.

5. **Manihot carthaginensis** (Jacq.) Muell. Arg. in DC. Prodr. **15**[2]: 1073. 1866.

Jatropha carthaginensis Jacq. Stirp. Amer. 256. *pl. 162. f. 1.* 1763.

Manihot chlorosticta Standl. & Goldm. Contr. U. S. Nat. Herb. **13**: 375, 1911.

Baja California to Chiapas and Yucatán. Southern Arizona, Central America and northern South America; type from Cartagena, Colombia.

Tree or shrub, sometimes 6 meters high, sparsely branched; leaves 8 to 12 cm. long, 5 or 7-lobate. "Xcaché" (Yucatán, Maya); "yuca de monte" (Costa Rica); "yuca," "yuquilla" (Venezuela), "cuadrado" (Sinaloa).

This species is said to be cultivated in Brazil for the fleshy roots, from which flour is obtained. The tubers are smaller than those of *M. utilissima*, but richer in starch. The seeds have emetic and purgative properties.

6. **Manihot intermedia** Weatherby, Proc. Amer. Acad. **45**: 427. 1910.

Guerrero; type from Iguala Canyon, altitude 915 meters.

Shrub, 1 to 2 meters high, glabrous; calyx bluish outside, yellowish within.

7. **Manihot microcarpa** Muell. Arg. Flora **55**: 42. 1872.

Type from Mexico, the locality not known.

Leaves 5 or 7-parted, 6 to 8 cm. long; calyx 11 to 12 mm. long; capsule 7 mm. long.

8. **Manihot esculenta** Crantz, Inst. Herb. **1**: 167. 1766.

Jatropha manihot L. Sp. Pl. 1007. 1753.

Manihot utilissima Pohl, Pl. Bras. **1**: 32. *pl. 24.* 1827.

Manihot manihot Karst. Deutsch. Fl. 588. 1880–83.

Cultivated, especially in Yucatán, Veracruz, Oaxaca, etc., and in some places escaped from cultivation. Native of Brazil, but cultivated in most tropical regions.

Shrub, usually 2 to 3 meters high; roots tuberous, elongate and thick; leaves 3 to 7-parted, 8 to 17 cm. long, usually glabrous and glaucous beneath; capsule about 1.5 cm. long, "Huacamote," "huacamotl," "huacamotli," "yuca," "yuca brava" (*Ramírez*); "cuacamote" (Oaxaca); "yuca amarga" (Yucatán); "yuca

agria" (Cuba); "cáxcamote" (Guatemala); "quiscamote" (Honduras); "guacamote" (Oaxaca, *Conzatti*).

Cassava[1] is one of the valuable food plants of the world, and the most important one in many tropical regions, taking the place of corn and wheat. It is much cultivated in some parts of Mexico, especially in the Yucatán Peninsula, and is said to have been introduced in preconquest times. The plants are grown from cuttings. Two well-marked varieties occur: One may be used without special treatment ("yuca dulce"); the other has very poisonous juice, the injurious principle of which is made harmless by heat. The poisonous properties have been attributed to hydrocyanic acid, but others claim that they are due to a peculiar principle, manihotoxine. Meal, starch, and cassava or tapioca are obtained from the roots. The first is prepared by peeling and grating the root, expressing the juice, and drying and sifting the meal, which must also be heated in the case of the poisonous variety. Starch is obtained by precipitation from an infusion of the grated roots. Tapioca is prepared by roasting the starch grains. The roots of the cassava plant also furnish a useful food for stock of all kinds. Cassaripe, the thickened gum obtained from the root of yuca agria, has antiseptic properties and is commonly used in Brazil for the preservation of meat. The Caribs prepared an intoxicating liquor from the roots. According to Barham, the fresh roots, when eaten, cause pain in the stomach, swelling of the abdomen, violent vomiting and purging, giddiness, chills, dimness of vision, and in a few hours death.

The cassava plant is treated at great length by Oviedo (Lib. VII, Cap. II) as well as by most other early writers upon tropical American natural history. He describes the method of cultivation with considerable detail. The yuca dulce, he states, was not known in the islands. He asserts that the yuca agria is poisonous to all animals except cows, horses, and rats, and that "a small draught of the juice will kill an elephant or any other animal or man." He does not claim to have had personal experience in the case of the elephant. "If this deadly juice is boiled two or three times, the Indians eat it, making soup of it, as a good pottage and tonic; but as it cools, they cease to eat it, for although it will not kill after it has been cooked, they say that it is difficult of digestion if eaten cold. If when the juice is expressed it is boiled down two-thirds and left to stand two or three days, it turns sweet, and this they use as a sweet beverage, mixing it with other food; and after it is boiled and settled, the juice turns sour and is used like vinegar or sour wine. * * * When there were many Indians in Hispaniola, if one of them wished to die, he ate the yuca roots, and after two or three days or less he died; but if he drank the fresh juice, he had no time for repentance, for his life ended then and there." Oviedo states that six varieties of yuca, which he names, were grown in Hispaniola. According to the same author, "yuca" was the Haitian name for the plant, and the bread made from it was known as "caçabi."

9. **Manihot dulcis** (Gmel.) Pax in Engl. Pflanzenreich IV. **147**[II]: 71. 1910.

Jatropha dulcis Gmel. Onom. Bot. **5**: 7. 1772–78.

Manihot aipi Pohl, Fl. Bras. Icon. Descr. **1**: 29. *pl. 23.* 1827.

Cultivated in Yucatán, Oaxaca, and perhaps elsewhere; in some localities said to be naturalized. Native of South America.

Shrub, 1 to 4 meters high; leaves deeply 3 to 13-parted, glabrous or nearly so; calyx 12 to 14 mm. long; capsule about 1.5 cm. long. "Yuca dulce"

[1] Introduced into Mexico in precolumbian times, and called by the Aztecs "quauhcamotl," "tree-potato."

(Yucatán, Oaxaca); "cuacamote dulce" (Oaxaca, *Reko*); "guh-yaga" (Oaxaca, Zapotec, *Reko*).

This species also has edible tuberous roots, which are often cooked as a vegetable. The starch is sometimes extracted.

10. Manihot pauciflora T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 89. 1910.

Puebla; type from Santa Lucía.

Glabrous shrub, 2 to 3 meters high, with dark brown branches; leaves 3-parted, the lobes broadly cuneate, about 1.5 cm. long; flowers solitary or fasciculate, the calyx 2 cm. long; capsule nearly 2 cm. in diameter.

Very unlike the other Mexican species, the leaves resembling those of some species of *Oxalis*.

11. Manihot olfersiana Pax in Engl. Pflanzenreich IV. 147[II]: 55. 1910.

Known only from the type locality, in Oaxaca.

Glabrous; leaves 10 to 14 cm. long; calyx 1 cm. long.

12. Manihot rhomboidea Muell. Arg. Linnaea 34: 205. 1865.

Described from Mexico, the locality not known.

Leaves 5 or 7-parted.

13. Manihot caudata Greenm. Proc. Amer. Acad. 39: 82. 1903.

Southern Chihuahua to Guanajuato and Michoacán; type from Batopilas, Chihuahua.

Shrub or small tree, 4 to 5 meters high; leaves deeply 3 to 7-lobate, the lobes 3 to 15 cm. long, tipped with a mucro 1 to 2 cm. long; capsule 1.8 to 2.2 cm. long.

14. Manihot aesculifolia (H. B. K.) Pohl, Pl. Bras. 1: 55. 1827.

Janipha aesculifolia H. B. K. Nov. Gen. & Sp. 2: 107. *pl. 109*. 1817.

Yucatán Peninsula; type from Bay of Campeche; Veracruz(?).

Glabrous; leaves 5 or 7-parted, 8 to 12 cm. long; calyx 1.5 to 1.8 cm. long, greenish. "Xchaché" (Maya); "yuca cimarrona" (*Ramírez*).

20. HURA L. Sp. Pl. 1008. 1753.

1. Hura polyandra Baill. Étud. Gén. Euphorb. 543. 1858.

Ignatia amara Sessé & Moc. Pl. Nov. Hisp. 21. 1887.

Sinaloa to Chiapas, Yucatán, and Veracruz; often planted; type from Echicovia, Oaxaca. Guatemala to Costa Rica.

Large tree, ofter 15 meters high, with a trunk 40 cm. or more in diameter, the crown broad and spreading, the bark grayish; branches and trunk often provided with sharp spines; leaves alternate, deciduous, long-petiolate, cordate-ovate, glabrous, crenate-dentate; flowers monoecious, apetalous, the pistillate in thick spikes; fruit depressed-globose, 8 to 10 cm. broad, about 15-celled; seeds flattened, brown, about 3 cm. long. "Ovillo" (Michoacán, Guerrero); "jabilla" or "habilla" (Yucatán, Veracruz, Morelos, Oaxaca, Guatemala, etc.); "solimanché" (Yucatán); "haba de San Ignacio" (Oaxaca, Puebla); "quauhtlatlatzin" "quauhayohuatli" (*Hernández*); "pepita de San Ignacio" (Morelos); "árbol del diablo," "haba de Guatemala" (Oaxaca); "haba de indio" (*Ramírez*); "tetereta" (Guatemala); "haba" (Sinaloa); "cuatatachi" (*Robelo*).

The Mexican plant has nearly always been referred to *H. crepitans* L., but that species, which has a wide range in the West Indies and South America, and extends into Costa Rica, probably does not reach Mexico. Strangely enough, also, the plant has been reported in some Mexican publications as *Strychnos ignatii*, a Philippine plant of a distantly related family. *Hura polyandra* dif-

fers from *H. crepitans* in the structure of the stamens, but otherwise resembles it closely, and it may be presumed that the two species have the same properties.

The wood is light and soft, whitish, with brown stripes; the specific gravity is about 0.50. It is used for various purposes but not very extensively. In parts of Mexico the trunks have been employed for telegraph poles. The copious milky juice is poisonous in contact with the skin or if taken internally. On the west coast it is much used for poisoning fish. The most curious part of the tree is the large fruit, which resembles a small pumpkin. When ripe the fruit explodes with considerable violence, scattering the sections (which are arranged like those of an orange) with the inclosed seeds in every direction. The seeds, which contain about 50 per cent of oil, have violent purgative properties, and are sometimes administered internally, but their use is dangerous. They are used for poisoning coyotes and other animals. The juice of this and *H. crepitans* is said to have been used as a remedy for elephantiasis and leprosy.

The English name usually applied is sandbox tree. This is derived from the fact that in early days the immature fruits were dried, and after the seeds had been removed the capsule was used as a container for the sand employed in drying or blotting ink.

The tree is figured by Hernández[1] and described in a chapter headed "De Quauhtlatlatzin,[2] seu arbore Crepitanti II."

21. MABEA Aubl. Pl. Guian. 2: 867. 1775.

1. Mabea occidentalis Benth. in Hook. Journ. Bot. 6: 364. 1854.

Tabasco and Chiapas. Central America and northern South America; type from Panama.

Slender shrub or tree, 2 to 6 meters high; leaves lance-elliptic or lanceolate, 5 to 15 cm. long, cuspidate-acuminate, coriaceous, entire or crenulate, very lustrous on the upper surface, glabrate; flowers monoecious, purplish, in long raceme-like panicles; capsule trisulcate, about 1.5 cm. long, puberulent.

The sap is said to yield a kind of rubber.

22. DALEMBERTIA Baill. Étud. Gén. Euphorb. 545. 1858.

Reference: Pax in Engl. Pflanzenreich IV. 147[v]: 268–270. 1912.

Shrubs, glabrous or pilose with simple hairs; leaves large, alternate, long-petiolate, entire, dentate, or lobate; flowers monoecious, apetalous, the spikes bisexual, the pistillate flowers numerous, very densely spicate.

Pistillate pedicels early reflexed ..... **1. D. populifolia.**
Pistillate pedicels not reflexed.
  Young branches ferruginous-pubescent ..... **2. D. triangularis.**
  Young branches glabrous.
    Leaves subentire or irregularly trilobate ..... **3. D. hahniana.**
    Leaves deeply 3 to 11-lobate ..... **4. D. platanoides.**

1. **Dalembertia populifolia** Baill. Étud. Gén. Euphorb. 346. *pl. 5, f. 11–15.* 1858.

Alcoceria pringlei Fernald, Proc. Amer. Acad. 36: 493. 1901.

Guerrero and Oaxaca.

Shrub, 3 to 5 meters high, glabrous or nearly so; leaves 5 to 14 cm. long and about as wide, often cuspidate at apex, remotely repand-dentate or 3 or 5-lobate, bright green; flowers purplish; capsule about 1 cm. wide, borne on a pedicel 1 to 4.5 cm. long.

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[1] Thesaurus 88. 1651.

[2] The Nahuatl name signifies "explosive tree."

2. **Dalembertia triangularis** Muell. Arg. Linnaea **34**: 218. 1865.
Type from Mexico, the locality not known.
Leaves 3.5 to 4 cm. long, cordate at base, usually 3-lobate, densely pubescent when young.

3. **Dalembertia hahniana** Baill. Adansonia **11**: 125. 1873.
Known only from the type locality, Xochicalco, Morelos.

4. **Dalembertia platanoides** Baill. Ann. Sci. Nat. IV. **9**: 197. 1858.
Known only from the type locality, mountain forests of Oaxaca.

23. GYMNANTHES Swartz, Prodr. Veg. Ind. Occ. 95. 1788.

REFERENCE: Pax in Engl. Pflanzenreich IV. **147**[v]: 81–11. 1912.
Glabrous shrubs or trees; leaves alternate, petiolate, entire or glandular-denticulate, stipulate; flowers usually monoecious, apetalous, spicate; capsule 3-sulcate.

Leaves mostly obovate, broadest above the middle; ovary stipitate. 1. G. lucida.
Leaves broadest at or below the middle; ovary sessile.
Mature leaves firmly membranaceous 2. G. riparia.
Mature leaves coriaceous.
Leaves rather dull, not reticulate-veined 3. G. actinostemonoides.
Leaves lustrous, prominently reticulate 4. G. longipes.

1. **Gymnanthes lucida** Swartz, Prodr. Veg. Ind. Occ. 96. 1788.
Yucatán. Southern Florida and the West Indies.
Shrub of tree, sometimes 10 meters high, with a trunk 20 cm. in diameter, the bark thin, smooth or somewhat scaly, brown; leaves 5 to 10 cm. long, short-petiolate, obtuse, crenate-serrulate or entire; capsule 7 to 9 mm. in diameter; wood hard, close-grained; dark brown, taking a fine polish, the specific gravity about 1.09. "Aité," "yaití," "aceitillo" (Cuba).
In the West Indies the wood is sometimes used for making canes. The milky juice is said to be very poisonous; if it falls upon the skin it produces inflammation or even ulceration.

2. **Gymnanthes riparia** (Schlecht.) Klotzsch, Arch. Naturg. **7**: 182. 1841.
Excoecaria riparia Schlecht. Linnaea **7**: 386. 1832.
Gymnanthes schlechtendaliana Muell. Arg. Linnaea **32**: 100. 1863.
Veracruz; type collected near Zoncuautla and Jalapa.
Leaves elliptic-lanceolate, 5 to 10 cm. long, 2.5 to 3 cm. wide, shortly cuspidate-acuminate, short-petiolate, obscurely crenate-serrulate; capsule 8 to 10 mm. long.

3. **Gymnanthes actinostemoides** Muell. Arg. Linnaea **32**: 103. 1863.
Veracruz; type from Zacuapan.
Shrub or tree, sometimes 13 meters high; leaves deciduous, elliptic-lanceolate to ovate-oval, 4 to 9 cm. long, acute or acuminate, crenate-serrulate.

4. **Gymnanthes longipes** Muell. Arg. Linnaea **34**: 216. 1865.
Veracruz and San Luis Potosí (type locality).
Leaves persistent, elliptic-lanceolate, cuspidate-acuminate, crenate-serrulate; capsule 9 mm. long.
The last three species are closely related and it is doubtful whether they are distinct.

24. SEBASTIANIA Spreng. Neu. Entd. 2: 118. 1821.

REFERENCE: Pax in Engl. Pflanzenreich IV. 147[v]: 88–153. 1912.

Trees or shrubs; leaves alternate, petiolate, usually serrulate, with small stipules; flowers usually monoecious, apetalous, spicate.

Bracts of the inflorescence petiolate ..... 1. S. adenophora.
Bracts sessile ..... 2. S. pavoniana.

1. **Sebastiania adenophora** Pax & Hoffm. in Engl. Pflanzenreich IV. 147[v]: 145. 1912.

Yucatán; type from Silam.

Shrub or tree, 3 to 6 meters high, glabrous; leaves ovate or oval-ovate, 3 to 5 cm. long, acute or acuminate, serrulate, slender-petiolate. "Kanchunup."

This has been reported from Yucatán as *Excoecaria glandulosa* Swartz.

2. **Sebastiania pavoniana** Muell. Arg. in DC. Prodr. 15[2]: 1189. 1866.

Gymnanthes pavoniana Muell. Arg. Linnaea 32: 106. 1863.
Sebastiania pringlei S. Wats. Proc. Amer. Acad. 26: 149. 1891.
Sebastiania palmeri Rose, Contr. U. S. Nat. Herb. 1: 112. 1891.
Sebastiania ramirezii Maury, Naturaleza II. 2: 405. 1894.

Sonora to Tepic and San Luis Potosí.

Shrub, 1.5 to 2.5 meters high, glabrous, with slender branches; leaves lanceolate or ovate, 4 to 11 cm. long, acuminate, irregularly serrulate; slender-petiolate; spikes slender, 1 to 3 cm. long; capsule about 1 cm. in diameter. "Palo de la flecha," "hierba de la flecha" (Sonora); "mincapatli" (Nahuatl).

The milky juice was employed formerly by the Indians for poisoning their arrows. The best-known part of the plant, however, is the fruit, which furnishes the famous "jumping beans" or "semillas brincadoras," which are a common article in curio shops of the Southwest. The following is a translation of the notes upon the subject published by Pax:

"The jumping seeds have a curved outer side, with a rounded keel, and two flat sides. They are yellowish gray and show on the outside no opening or point of injury. If they are laid upon one of the flat sides, with a quick movement they turn upon the other. A longer time is demanded for the movement from the curved side to one of the flat ones. Frequently the beans hop several millimeters in the air, and thus they may also move forward.

"Soon after the first notice of these peculiar seeds it was conjectured that the cause of the movement must be a living occupant, which was verified by investigation. In the 'jumping beans' lives the whitish larva of a small butterfly belonging to the *Tortricidae*, named by Westwood as *Carpocapsa saltitans*. The insect occurs especially in the Mexican States of Sonora, Michoacán, Guerrero, Puebla, and Veracruz. The larva consumes the contents of the 'seed' and covers the inner surface of the latter with a web. The French entomologist Lucas gives as an explanation of the jumping that the larva, which lacks much of filling the cavity, supports itself upon the web by its body-feet, then loosens its chest-feet and anterior body-feet, stretches itself out violently, and strikes upon the wall of its dwelling with its head.

"With a warm temperature the intensity of the movement increases, although it is not brought to a halt by a lower temperature. Consequently the seeds occasionally brought to Europe retain their movement for some time. In Berlin the larvae survived for weeks in unheated rooms. Buchenau reports that Martens in 1871 brought jumping seeds to Europe * * *. He had left Mexico in the middle of June. There was no longer any food left in the seeds for the larvae. Nevertheless their violent movements continued until March of the following year. In April the larvae changed into chrysalises, and in May or June the butterflies emerged, for which they lifted up a circular lid which

the larva earlier had cut out of the seed wall. Different investigations were made in order to discover the advantage derived by the insect from the movements. Some observers, among them Ascherson, surmise that the jumping of the seeds is a means of frightening seed-eating animals, an explanation which can scarcely be considered adequate. The 'jumping beans' are not produced in equal abundance every year. Many years none at all are found."

The "jumping beans" were not known in Europe until 1854, when some were sent to England by the British minister, and the determination of the plant which produced them was long unknown. In Mexico they are known to be derived in part from *Sapium biloculare*, and probably they are borne by plants of other related genera.[1] In other countries also similarly affected fruits are found in nearly related plants: In Africa, *Sapium ellipticum* (Hochst.) Pax; in Brazil and Chile, species of *Colliguaya*.

It may be that more than one species is represented here, but this seems very doubtful.

25. CORYTHEA S. Wats. Proc. Amer. Acad. 22: 451. 1887.

Shrubs; leaves alternate, petiolate, crenate, stipulate; flowers monoecious (?), the staminate glomerate in the axils of scarious galeate bracts; staminate sepals 4; pistillate sepals 6; capsule 3-celled, tuberculate.

The following are the only species known.

Pistillate flowers solitary or fasciculate in the axils; leaves short-petiolate. 1. C. filipes.

Pistillate flowers racemose; leaves long-petiolate 2. C. multiflora.

1. Corythea filipes S. Wats. Proc. Amer. Acad. 22: 451. 1887.

Known only from the type locality, barranca near Guadalajara, Jalisco.

Slender shrub, about 2 meters high; leaves alternate, thin, ovate to oblong-elliptic, 3 to 7 cm. long, obtuse or acutish, obtuse at base, coarsely crenate, puberulent or glabrate; staminate flowers spicate; pedicels 3 cm. long or less.

2. Corythea multiflora Standl., sp. nov.

Type collected between Acaponeta and Concepción, Tepic (*Rose* 1532; U. S. Nat. Herb. no. 300375).

Branchlets sparsely pubescent or glabrate; stipules small, scarious; petioles 6 cm. long or less; leaf blades elliptic-ovate to rounded-ovate, 5 to 12 cm. long or larger, acute or obtuse, rounded to subcordate at base, coarsely crenate, puberulent along the veins, 3 or 5-nerved at base; pistillate flowers few or numerous, racemose, the racemes 3 to 5 cm. long, the slender pedicels 2 to 10 mm. long, puberulent; capsule (immature) 3-lobate, strongly tuberculate, puberulent.

26. HIPPOMANE L. Sp. Pl. 1191. 1753.

1. Hippomane mancinella L. Sp. Pl. 1191. 1753.

Chiefly along seashores, Veracruz and Yucatán; Oaxaca; Socorro Island. Southern Florida, West Indies, Central America, and northern South America.

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[1] The following literature upon the subject may be cited: C. V. Riley, Mexican jumping beans and the plants upon which they are produced, Amer. Garden 1891: 552–554. 1891; C. V. Riley, Mexican jumping beans, Proc. Entomol. Soc. Washington 2: 178–181. 1892; José Ramírez, Otros datos para la historia de las semillas brincadores, Naturaleza II. 2: 403; José Ramírez, Nuevos datos para la historia de las semillas brincadoras, Naturaleza II. 2: 408.

Tree, sometimes 18 meters high, with a trunk 90 cm. in diameter, but usually much smaller, the branches spreading, forming a rounded crown, the bark thick, scaly, gray or brown; leaves alternate, persistent, ovate or oval, 4 to 10 cm. long, usually acute or short-pointed, crenulate-serrate, long-petiolate; flowers monoecious, in stout spikes; fruit drupaceous, 2.5 to 3.5 cm. broad, shallowly 6 or 8-lobate, yellow or yellowish green, tinged with red; wood soft, close-grained, dark brown, its specific gravity about 0.53. "Manzanillo" (Oaxaca, Veracruz, Cuba, Porto Rico, Santo Domingo, etc.); "árbol de la muerte" (Oaxaca); "manzanillo de la playa" (Costa Rica); "mançanila" (Colombia, Venezuela); "pinipiniche," "penipeniche" (Cuba); "hinchahuevos" (Mexico); "manzanillo de la costa" (Cuba).

The usual English name is "manchineel," evidently a corruption of the Spanish "manzanillo," the latter name having been applied by the early Spanish explorers because of the resemblance of the fruit to an apple. The milky juice was used by the Caribs for poisoning their arrows. It is very poisonous if taken internally, and upon the skin produces severe inflammation, but some people seem to be immune to the external effects of the juice. The smoke from the burning wood will cause inflammation of the eyes. The early explorers gave the most extravagant reports of the plant, stating that a person who rested beneath a tree would be blinded, or even die, but these statements were long ago proved to be erroneous. The wood has been employed in the West Indies for cabinetwork and interior finish, but great care must be taken in working with it, even when dry, and in cutting the trees. The fruit was often mistaken by the early explorers for crabapples, and was sometimes eaten with fatal results. It is reported in the West Indies that the flesh of fish or crabs which eat the fruit is poisonous, but goats are said to eat the fallen fruit greedily without injurious results. The seeds and bark have been employed as a vermifuge, but their use is dangerous. A gum which exudes from the trunk has been used in Jamaica in the treatment of dropsy and venereal diseases.

There are many references to manchineel in early American literature. Oviedo (Lib. IX, Cap. XII) writes of it as follows:

"In these regions there are innumerable *manzanillos*, with which and other poisonous mixtures the Indians are accustomed to make that diabolic poison for their arrows. These trees are usually low or spreading and some are more than 6 yards high; they have large tops full of leaves which resemble those of the pear. The trees are loaded with a fruit like apples, of good odor, as large as pears but round, or sometimes elongate, variegated with red, which gives them a pleasing appearance; but both they and the tree are poisonous in their effects. In Hispaniola the Indians did not use the plant, but there is no man who sees the fruit, if he does not know it, who does not wish to feast upon it, for its appearance and odor are inviting. It has been proved many times that if men carelessly lie down to sleep under the trees, when they rise after a short nap there is great pain in the head and swelling of the eyes and cheeks. And if by chance the dew from the tree falls on the face, it is like fire, blistering and burning the skin wherever it touches; and if it falls in the eyes it blinds or burns them, and the sight is endangered. If the wood is burned no one can endure it long, for it causes much heaviness, and such headache that all stand away from it, be they men or any other animals." Oviedo also cites one instance of a man who ate five or six of the fruits and was not injured thereby.

Richard Ligon, in one of the early English publications upon the West Indies,[1] which is quaintly written and full of interesting information, gives the following notes about the manchineel:

"The people that have lived long there, say, 'tis not wholsom to be under the shade of this tree. The fellers, as they cut them down, are very careful of their eyes; and those that have Cipers, put it over their faces; for if any of the sap fly into their eyes, they become blind for a month. * * * Yet, of this timber we make all, or the most part, of the Pots we cure our Sugar in; for, being sawed, and the boards dryed in the Sun, the poyson vapours out. * * * The fruit is like an apple *John*, and 'tis said to be one of those poysons, wherewith the Indian Caniballs envenome their arrows."

27. SAPIUM Jacq. Stirp. Amer. 249. 1763.

REFERENCE: Pax in Engl. Pflanzenreich IV. 147[v]: 199–258. 1912.

Trees or shrubs, glabrous; leaves alternate, petiolate, usually glandular-denticulate, the stipules small; flowers monoecious, apetalous, spicate, the spikes terminal or lateral.

Some of the species are said to be used for dyeing and tanning. *Sapium jenmanii* Hemsl. is the chief source of rubber in British Guiana. *S. verum* Hemsl., of Colombia, is an important source of rubber, and the same is true of *S. pavonianum* Huber, also a native of Colombia, where it is known as "palo de leche."

Spikes lateral or axillary; leaves mostly 15 to 20 cm. long---1. S. lateriflorum.
Spikes terminal; leaves mostly less than 15 cm. long.
  Glands at base of the leaf blade small, depressed.
    Leaves oval, 3 to 5.5 cm. wide----------2. S. appendiculatum.
    Leaves narrowly oblong or linear-oblong, less than 1.5 cm. wide. 3. S. biloculare.
  Glands large, conic or cylindric.
    Capsule sessile or nearly so; lateral nerves of the leaves nearly horizontal and straight----------4. S. macrocarpum.
    Capsule long-stipitate; lateral nerves ascending, arcuate. 5. S. pedicellatum.

1. Sapium lateriflorum Hemsl. in Hook. Icon. *pl. 2680*. 1901.

Sinaloa to Oaxaca, Tabasco, and Veracruz. Guatemala.

Tree; leaves mostly elliptic, 10 to 20 cm. long, 5 to 6 cm. wide, usually rounded and short-pointed at apex, entire or nearly so, long-petiolate, with two large conic glands at the apex of the petiole. "Hierba de la flecha," "palo de la flecha" (Oaxaca); "hiza" (Sinaloa).

The milky sap is reported to be irritating and poisonous.

2. Sapium appendiculatum (Muell. Arg.) Pax & Hoffm. in Engl. Pflanzenreich IV. 147[v]: 214. 1912.

Stillingia appendiculata Muell. Arg. Linnaea **32**: 87. 1863.

Sinaloa to southern Chihuahua and Oaxaca.

Slender tree, 8 meters high; leaves long-petiolate, 5 to 10 cm. long, short-pointed at apex, serrulate or entire, often glaucescent; capsule 9 mm. long. "Hierba de la flecha" (Sinaloa); "palo de la flecha" (Sinaloa, Chihuahua).

As in other species, the milky juice is poisonous, and was used by the Indians for poisoning their arrows.

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[1] Richard Ligon, a true and exact history of the island of Barbadoes, p. 68. 1673.

3. **Sapium biloculare** (S. Wats.) Pax in Engl. Pflanzenreich IV. 147^{v}: 221. 1912.

Sebastiania bilocularis S. Wats. Proc. Amer. Acad. 20: 374. 1885.

Sonora and Baja California; type collected between Rayón and Ures, Sonora.

Shrub or tree, sometimes 6 meters high; leaves 3 to 7 cm. long, short-petiolate, often glaucescent, rounded to acuminate at apex, glandular-serrulate; fruit 2-celled, about 1 cm. long. "Hierba de la flecha" (Sonora, Baja California); "hierba mala" (Sonora); "mago," "magot" (Opata).

This plant, like *Sebastiania pavoniana*, produces "jumping beans" (see p. 648). The juice is poisonous as in other species, and in Baja California the finely chopped branches are thrown in water to stupefy fish. Exposure to smoke from the burning wood or sleeping in the shade of the tree is said to cause sore eyes. The juice is said to be used by the Opata Indians to poison their arrows, but according to McGee[1] the evidence to this effect is not conclusive.

This is probably the plant to which Clavigero (Historia de la California, 1789) makes reference, as follows:

"Among the few plants of California there are some harmful ones, one of which is a certain shrub called by the Spaniards of that region *palo de la flecha*, for from it the Indians dwelling along the coast of Sonora obtain the terrible poison with which they poison their arrows, so as to cause mortal wounds. The Californians, although they are acquainted with the evil properties of the plant, have never employed it."

The leaves are broader in Baja California specimens than in those from Sonora, but it is doubtful whether the peninsular plant differs essentially. For an illustration of the tree see Contr. U. S. Nat. Herb. 16: *pl. 117, B.*

4. **Sapium macrocarpum** Muell. Arg. Linnaea 32: 119. 1863.

Sapium mexicanum Hemsl. in Hook. Icon. Pl. *pl. 2680.* 1901.

Guanajuato to Morelos.

Tree, 4.5 to 9 meters high; leaves 7 to 15 cm. long, 2 to 4 cm. wide, acute or obtuse, long-petiolate, obscurely denticulate; seeds nearly 1 cm. long. "Palo lechón," "hincha huevos" (Morelos).

The juice causes inflammation if it comes in contact with the skin. The wood is weak and soft.

5. **Sapium pedicellatum** Huber, Bull. Herb. Boiss. II. 6: 352. *f. 9.* 1906.

Sinaloa to Colima.

Tree of medium size; leaves 5 to 12 cm. long, long-petiolate, acuminate or short-pointed, serrulate; seeds 5 to 7 mm. long. "Higuerillo bravo" (Colima).

28. STILLINGIA A. Garden in L. Mant. Pl. 19. 1767.

Reference: Pax in Engl. Pflanzenreich IV. 147^{v}: 180–199. 1912.

Glabrous shrubs; leaves alternate or opposite, petiolate, glandular-serrate; flowers monoecious, apetalous, spicate, the spikes usually terminal; capsule 3 or 2-lobate.

A few herbaceous species occur in Mexico.

The dried root of *S. sylvatica* L., a United States species, is official in the U. S. Pharmacopoeia. The plant is known locally as "queen's-delight" and "yaw-root." The root is said to contain an alkaloid, stillingine. The fluid extract is used in large doses as an emetic and cathartic and in smaller ones as

[1] Ann. Rep. Bur. Amer. Ethnol. 17: 259*. 1898.

an alterative. It is employed for syphilitic affections, scrofula, cutaneous diseases, and chronic hepatic affections.

Hernández gives two figures[1] that appear to represent species of this genus, both without description. Each is said to bear the name "amozotl."

Staminate flowers solitary in the bracts.
  Staminate calyx 1.5 mm. long ---------- 1. S. acutifolia.
  Staminate calyx 3 to 3.5 mm. long ---------- 2. S. macrantha.
Staminate flowers several in each bract.
  Leaves opposite ---------- 3. S. sanguinolenta.
  Leaves alternate.
    Leaves linear or lance-linear, less than 8 mm. wide ---- 4. S. bicarpellaris.
    Leaves lanceolate or elliptic, 12 to 22 mm. wide ---------- 5. S. zelayensis.

1. **Stillingia acutifolia** Benth.; Hemsl. Biol. Centr. Amer. Bot. 3: 135. 1883.
Sapium acutifolium Benth. Pl. Hartw. 90. 1842.
Stillingia propria T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 185. 1915.
Chiapas. Guatemala; type from Hacienda de Argueta.
Shrub; leaves alternate, ovate-lanceolate, 4 to 7 cm. long, acuminate, sharply serrate; capsule 5 mm. long.

2. **Stillingia macrantha** (Muell. Arg.) Benth.; Hemsl. Biol. Centr. Amer. Bot. 3: 135. 1883.
Gymnostillingia macrantha Muell. Arg. Linnaea 32: 90. 1863.
Based upon a plant said to have been collected in Mexico by Pavón.
Leaves ovate-lanceolate, 6 to 7 cm. long, cuspidate-acuminate, serrate.

3. **Stillingia sanguinolenta** Muell. Arg. Linnaea 32: 88. 1863.
Nuevo León, San Luis Potosí, and Veracruz; type from "Baños de Atot."
Shrub, about a meter high or smaller; leaves linear-lanceolate to ovate, 2 to 5 cm. long, serrate.
Very variable in leaf shape. Material from Chiapas is closely related.

4. **Stillingia bicarpellaris** S. Wats. Proc. Amer. Acad. 21: 455. 1886.
Coahuila to Guanajuato and Hidalgo; type from Sierra Jimulco, Coahuila.
Shrub, 1 to 1.5 meters high; leaves 3 to 7 cm. long, very shortly petiolate, remotely glandular-denticulate; capsule about 9 mm. long.

5. **Stillingia zelayensis** (H. B. K.) Muell. Arg. Linnaea 32: 87. 1863.
Sapium zelayense H. B. K. Nov. Gen. & Sp. 2: 51. 1817.
Jalisco to San Luis Potosí and Morelos; type from Celaya, Guanajuato.
Shrub, about a meter high; leaves 3.5 to 9.5 cm. long, acuminate to very obtuse, sharply serrulate; capsule 10 to 12 mm. long.

77. BUXACEAE. Box Family.

Shrubs or small trees; leaves opposite, persistent, entire; flowers unisexual, in axillary inflorescences, small and inconspicuous; perianth of 4 or 5 sepals in the staminate flowers; petals none; stamens 4 or numerous; ovules solitary or geminate; fruit a 3-celled capsule.

Stamens 4; capsule 3-horned at apex ---------- 1. BUXUS.
Stamens numerous; capsule not 3-horned ---------- 2. SIMMONDSIA.

1. BUXUS L. Sp. Pl. 983. 1753.

Shrubs, glabrous or pubescent; leaves short-petiolate, coriaceous; flowers in dense axillary clusters, sessile or short-pedicellate; stamens opposite the sepals; sepals 6 in the pistillate flowers; seeds 3-angled.

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[1] Thesaurus 349, 458. 1651.

The Old World box, *Buxus sempervirens* L., which is the best-known species, is often grown as a hedge plant. The plant is bitter and contains an alkaloid, buxine. A volatile oil distilled from the wood has been used in epilepsy, and a decoction of the wood has been employed in the treatment of rheumatism and secondary syphilis. A tincture of the wood was formerly employed as an antiperiodic. The leaves have been used in Europe as a substitute for hops in brewing beer.

Leaves and branches copiously pubescent.....1. B. pubescens.
Leaves and branches glabrous.
Leaves mostly oblanceolate, 4 to 6 cm. long, acute.....2. B. lancifolia.
Leaves oval or elliptic, 1.5 to 2 cm. long, obtuse or rounded at apex. 3. B. mexicana.

1. **Buxus pubescens** Greenm. Proc. Amer. Acad. 33: 481. 1898.

Known only from María Madre Island, Tepic.

Shrub or small tree, 4.5 to 8 meters high; leaves rhombic-ovate or oblong-ovate, 2 to 5 cm. long, 1.5 to 3 cm. wide, obtuse or acutish, glabrate on the upper surface; calyx 2 mm. long; ovary glabrous.

2. **Buxus lancifolia** T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 273. 1912.

Known only from the type locality. Río de las Gallinas, near Rascón, San Luis Potosí.

Glabrous shrub; leaves subsessile. about 1.5 cm. wide, 3-nerved; calyx 2 mm. long; stamens exserted.

3. **Buxus mexicana** T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 382. 1909.

Known only from the type locality, summit of Cerro de Coatepe, near San Luis Tultitlanapa, Puebla, altitude 2,100 to 2,400 meters.

Glabrous shrub, 1 meter high; leaves short-petiolate, 5 to 12 mm. wide; sepals 3.5 mm. long, pubescent; capsule about 8 mm. long.

2. SIMMONDSIA Nutt. Lond. Journ. Bot. 3: 400. 1844.

1. **Simmondsia californica** Nutt. Lond. Journ. Bot. 3: 401. *pl. 16.* 1844.

Simmondsia pabulosa Kellogg, Proc. Calif. Acad. 2: 21. 1859.

Sonora and Baja California. Southern California; type from San Diego.

Shrub or small tree, 1 to 4.5 meters high, with dichotomous puberulent branches; leaves oblong to oval, 3 to 6 cm. long, nearly sessile, obtuse or rounded at apex, pale green, strigillose; flowers dioecious, the staminate in sessile or pedunculate clusters, the pistillate solitary, on recurved pedicels; sepals 5; pistillate calyx accrescent in fruit; capsule 3-valvate, about 3 cm. long; seeds by abortion usually one. "Jojoba" (Sonora, Baja California).

Known in California as "pignut," "goatnut," "sheepnut," "wild hazel," and "quinine plant." Goats, sheep, and deer are fond of the fruit and leaves. The seeds have the flavor of chestnuts or hazelnuts, with a slight bitterness. The Indians ate them either raw or parched, and sometimes used them as a substitute for coffee. The seeds contain about 48 per cent of oil, which is used locally as a hair tonic. In southern California and northern Mexico the native people sometimes make a beverage from the seeds by roasting them and grinding them with the yolk of hard-boiled egg, then boiling the mass in water with sugar and milk, thus making a well-flavored and nourishing substitute for chocolate or coffee.

The first reference to the plant is that of Clavigero (Historia de la California, 1789), whose account is as follows: "The *jojoba* is one of the most highly valued fruits of California. The plant which produces it is a shrub which grows on the dry slopes of the mountains, and its leaves are oblong,

notched, smooth, the size of those of the rose, of a rather grayish green color. The fruit is an oblong berry, the size of a filbert kernel, dark red outside, white within, and with an oily and not unpleasant flavor. This fruit has become noted because of its medicinal virtues, especially as a remedy for retention of the urine, resulting from phlegmonous concretions, as an aid to parturition, and as a cure for wounds. The oil obtained from it is an excellent remedy for cancer, and since it has a good flavor, some of the people of California use it in salads like olive oil. This plant does not bear fruit every year, but only when there has fallen at least a heavy shower in the winter."

78. CORIARIACEAE. Coriaria Family.

1. CORIARIA L. Sp. Pl. 1037. 1753.

1. **Coriaria thymifolia** Humb. & Bonpl.; Willd. Sp. Pl. 4: 819. 1805.
Coriaria atropurpurea DC. Prodr. 1: 740. 1824.
Coriaria cuneifolia Sessé & Moc. Pl. Nov. Hisp. 173. 1887.

Jalisco to San Luis Potosí, Mexico, and Chiapas. Central America and South America; New Zealand; type from Ecuador.

Slender shrub or small tree, 1 to 4 meters high; leaves opposite, subsessile, distichous, lance-oblong or oblong-ovate, 1 to 2 cm. long, acute or acutish, puberulent or glabrate; flowers small, perfect, in long slender racemes, puberulent; sepals 5, imbricate, persistent; petals shorter than the sepals; stamens 10; fruit of 5 to 8 laterally compressed cocci, purplish. "Tlalocopetate," "tlalocopetlatl"[1] (Nahuatl); "tisís" (Venezuela).

The slender lateral branches with the crowded distichous leaves suggest a compound leaf. The plant contains a toxic principle, coriamyrtine, which in animals causes convulsions, increase in the respiratory movement and heart action, and finally death by asphyxiation and nervous exhaustion. Children have been poisoned by eating the fruit, and in Mexico the plant is used for poisoning dogs and other animals. In Ecuador the fruit is used to make ink, which has a beautiful violet color; it writes black, but after a few hours reddens, and the writing is said to be indelible. Other species, notably *C. myrtifolia* L. of the Mediterranean region, have similar properties. *C. myrtifolia* is rich in tannin and is employed for tanning skins, and the leaves yield a black dye.

79. ANACARDIACEAE. Cashew Family.

REFERENCE: Engler in DC. Monogr. Phan. 4: 171–500. 1883.

Trees or shrubs, usually with resinous sap; leaves alternate, estipulate, simple, trifoliolate, or pinnate; flowers small, paniculate, perfect, dioecious, or polygamous; calyx 3 to 5-lobed or parted; petals 3 to 5, rarely none; stamens as many as the petals or twice as many; fruit superior, usually drupacous.

Ovary 2 to 5-celled. Leaves pinnate.
- Petals valvate in bud. Fruit glabrous ..... **1. SPONDIAS.**
- Petals imbricate.
  - Fruit glabrous; embryo curved; leaves nearly glabrous ..... **2. TAPIRIRA.**
  - Fruit pubescent; embryo straight; leaves densely pubescent. **3. CYRTOCARPA.**

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[1] The Nahuatl name signifies "dwarf-ocopetlatl," *ocopetlatl* being a kind of fern.

Ovary 1-celled.
  Fruit large, more than 2 cm. long; leaves simple.
    Receptacle of the fruit enlarged and fleshy; drupe reniform, compressed. **4. ANACARDIUM.**
    Receptacle not enlarged; drupe ovoid, not compressed--**5. MANGIFERA.**
  Fruit comparatively small, rarely over 1 cm. long; leaves usually compound, sometimes simple.
    Petals none----------**6. PISTACIA.**
    Petals present.
      Stamens twice as many as the petals.
        Fruit globose; petals deciduous----------**7. SCHINUS.**
        Fruit compressed; petals deciduous----------**14. PACHYCORMUS.**
      Stamens as many as the petals.
        Pericarp not separating from the mature fruit.
          Calyx in fruit accrescent and winglike----------**8. ASTRONIUM.**
          Calyx not accrescent.
            Flowers 3 or 4-parted; leaflets usually dentate or sinuate. **9. COMOCLADIA.**
            Flowers 5-parted; leaflets entire.
              Leaflets long-petiolulate; flowers polygamous. **10. METOPIUM.**
              Leaflets nearly sessile; flowers dioecious. **11. MOSQUITOXYLUM.**
        Pericarp separating easily from the fruit when dry.
          Fruit strongly compressed, flat, broader than long, glabrous. **12. PSEUDOSMODINGIUM.**
          Fruit not compressed or only slightly so, usually as long as broad, pilose or sometimes glabrous----------**13. RHUS.**

1. SPONDIAS L. Sp. Pl. 371. 1753.

Trees or shrubs; leaves large, pinnate, deciduous, the leaflets unequal at base; flowers small, pedicellate, paniculate, polygamous; sepals 4 or 5; petals 4 or 5, oblong-ovate, acute, spreading, valvate; stamens 8 or 10; fruit a drupe with large, usually 5-celled stone.

Leaflets acute to rounded at apex, mostly 2 to 5 cm. long; panicles mostly 2 to 4 cm. long----------**1. S. mombin.**
Leaflets abruptly obtuse-acuminate, mostly 6 to 10 cm. long; panicles usually 15 to 30 cm. long----------**2. S. lutea.**

1. Spondias mombin L. Sp. Pl. 371. 1753.
   Spondias purpurea L. Sp. Pl. ed. 2. 613. 1762.
   Spondias mexicana S. Wats. Proc. Amer. Acad. **22**: 403. 1887.

Sinaloa and Jalisco to Yucatán and Chiapas. Widely distributed in tropical America.

Shrub or tree, sometimes 10 meters high, with thick branches; bark smooth, grayish or white; leaflets 5 to 12 pairs, often subsessile, very variable in shape, pubescent when young but soon glabrate; petals purple, 3 mm. long; fruit 2 to 3 cm. long, usually purplish. "Ciruela" (the fruit; Spanish word for "plum"), "ciruelo" (the tree; Guerrero, Jalisco, Yucatán, Central America, etc.); "chiabal" (Yucatán); "ciruela agria," "ciruela roja," "ciruela colorada," "ciruela de México," "ciruela del país" (various localities); "jobo," "hobo," or "xobo" (Morelos, Guerrero, Veracruz, Colombia, Santo Domingo, Porto Rico); "biaxhi" (Oaxaca, Zapotec, *Reko*); "jocote" (Oaxaca, etc., Cen-

tral America; from the Nahuatl, *xocotl*[1]); "abal" (Yucatán, Maya); "atoyaxotl," "costixocotl," "atoyaxocotl" (Nahuatl); "capuatlcacao" (Mexico, Morelos, *Ramírez*); "cupu" (Tarascan); "jocote tronador," "sismoyo" (Costa Rica); "ciruela campechana" (Cuba); "jobillo," "jobo francés" (Porto Rico); "ciruela calentana" (Colombia).

The English name is "hog plum." The tree is common in many parts of Mexico and is often planted, especially along fences. According to Merrill, it was introduced into the Philippines at an early date, and the name used there by the Tagalogs is "sirihuelas," evidently a corruption of "ciruela."

Usually the plant is only a shrub, with few long branches which frequently spread along the ground, but often it gets to be a small tree. It grows readily from cuttings. The wood is white or yellowish and when procurable in sufficiently large pieces may be used for interior finish and other purposes; it has been used in Brazil for paper pulp. The fruit varies greatly in size and quality. The skin is rather thick, usually purplish, but often yellow. The flesh is acidulous and somewhat resinous. Large quantities of the fruit are eaten in Mexico, raw or cooked, and it is sometimes dried or made into sweetmeats. It is used also to make cooling beverages and sometimes for intoxicating liquors. There is a popular belief in Mexico that if eaten in too great quantity the fruit causes fevers. Cattle and pigs are very fond of the fruits and fatten upon them.[2] The fruit is reputed to have diuretic and antispasmodic properties.

The tree is treated by most of the early writers upon tropical America. Oviedo (Lib. VIII, Cap. XXI) treats of it under the names "xocot," "ciruelo," and "hobo." "The wine made from the fruit," he says, "is of fair quality and keeps a year; to me it appears better than the apple cider of Vizcaya. * * * They also make very good vinegar of the *ciruelas*, and a good green sauce with them and *axi*." *Spondias purpurea* is illustrated by Hernandez,[3] but without description, under the name "mazaxochotli." It is probably to this species also that Sahagún refers, under the names "macaxocotl" and "atoyaxocotl." The latter, he states, "is a large plum, sweet, and very good to eat, either raw or cooked. They make from it a drink more intoxicating than *pulque*."

2. Spondias lutea L. Sp. ed. 2. 613. 1762.

Veracruz, Tabasco, Yucatán, Oaxaca, and perhaps elsewhere. Widely distributed in the Tropics of both hemispheres.

Tree, often 10 to 15 meters high, with broad crown; leaflets, 5 to 9 pairs, conspicuously petiolulate, oblong or ovate-oblong, glabrous or nearly so; flowers, fragrant, white; petals, 3 mm. long; fruit, ovoid, yellow, 3 to 4 cm. long. "Jobo," "hobo," "jovo" (Veracruz, etc., Central America, Cuba, Venezuela); "abal," "xkinin-hobó," "mompin" (Yucatán); "ciruela" (Yucatán, Nicaragua); "ciruela amarilla" (Veracruz, Oaxaca); "chupandilla" (Oaxaca, *Reko*); "pompoqua," "popoaqua" (Michoacán, Tarascan, *León*); "cozticxocotl," "coztilxocotl" (Nahuatl); "jobo espino," "jobo roñoso"

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[1] The name indicates an acidulous fruit, and was applied generally to plum-like fruits, in contradistinction to *zapotl*, or "sweet-fruit."

[2] For an account of the horticultural aspects of the genus *Spondias* see Popenoe in Bailey, Stand. Cycl. Hort. 3216–3217, 1917. For an account of the production of lac on *Spondias* see p. 641 of the present work, under *Jatropha curcas*.

[3] Thesaurus 384. 1651.

(Tabasco, *Rovirosa*); "ciruelo obo," "obo de zopilote" (Oaxaca, *Reko*); "jobo hembra," "jobo negro," "jobito," "ciruela agria," "ciruela loca" (Cuba); "jocote de jobo" (Nicaragua); "palo de mulato" (Guatemala).

This species is rather rare in Mexico but it is sometimes found in cultivation; it may be that it is not native there. *Spondias lutea* is similar to *S. mombin* in its properties, but the fruit, although larger, is of inferior quality. The wood is described as soft but strong, grayish yellow, with a specific gravity of about 0.508. This species has doubtless been confused in Mexico with *S. mombin.* In the latter the fruit is either purple or yellow, while in *S. lutea* it is always yellow.

Spondias lutea is treated at length by Oviedo (Lib. VIIII, Cap. II) under the name "hobo" (a word of Carib origin). "The young shoots of this tree," he states, "are good for shaving the face, and for bathing the limbs, and they are of exquisite odor. The bark of the *hobo* tree, boiled and used to bathe the limbs, is astringent and relieves exhaustion due to traveling, and it is a healthful bath. And when in the country men seek a sleeping place they try to have it beneath this tree, for its shade keeps off the dew and never causes headache as many other trees do. * * * There may be mentioned another property of this tree which can be tested any day that one wishes or that necessity compels. When in traveling water can not be found and men are suffering from thirst, if trees of this sort are at hand they dig out the roots, and cutting a piece put one end in the mouth and raise the other, whereupon there comes forth enough water to satisfy any thirsty man. * * * This have I tried, as well as many others overcome by thirst, and it was learned from the Indians."

2. TAPIRIRA Aubl. Pl. Guian. 1: 470. 1775.

1. Tapirira mexicana Marchand, Rév. Anacard. 162. 1869.

Veracruz.

Large tree; leaves pinnate, glabrous, the leaflets 5 to 9, oblong or oblong-lanceolate, 6 to 10 cm. long, obtuse or acute; flowers small, paniculate, polygamo-dioecious; branches of the inflorescence appressed-pubescent; sepals 5; petals 5, 2.5 mm. long, ovate; stamens 10; fruit an ovoid drupe, about 1.7 cm. long.

3. CYRTOCARPA H. B. K. Nov. Gen. & Sp. 7: 19. 1825.

Trees; leaves pinnate, deciduous, the leaflets entire, densely pubescent beneath; flowers small, in axillary panicles, polygamous; sepals 5, ovate, imbricate; petals 5, oval, spreading; stamens 10; fruit a large drupe, the stone 1 or 2-celled.

Leaflets about 17, oblong or lance-oblong, mostly 4 to 7 cm. long__1. **C. procera.**
Leaflets usually 7 to 11, mostly oval, 1 to 3 cm. long_____2. **C. edulis.**

1. Cyrtocarpa procera H. B. K. Nov. Gen. & Sp. 7: 20. *pl. 609.* 1825.

Dasycarya mexicana Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 98. 1854.

Tapirira purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 382. 1909.

Jalisco to Puebla and Oaxaca; type from Mexcala, Guerrero.

Tree, 6 meters high or larger, densely pubescent throughout; leaflets opposite or the upper ones alternate, obtuse or acutish, the rachis often narrowly winged; panicles about 6 cm. long; petals white, 3 mm. long; fruit pubescent, about 2 cm. long. "Copaljocote," "copalcocote" (Guerrero, Oaxaca, Jalisco, Morelos; from the Nahuatl *copalxocotl*); "copal" (Guerrero, Oaxaca, *Ramírez*); "copalhi" (*Ramírez*); "maxocote" (Oaxaca, *Villada*); "popoaqua" (Tarascan); "chupandía" (*Conzatti*).

The wood is said to be soft and purplish, with a strong odor, and to be used for making trays, small images, and other articles. Goats are fond of the leaves. The fruit, which is much eaten, is yellow and the flesh resinous, with acid flavor. The fruits are said to be known at Jojutla (Morelos) as "berracos" and "chupandías." The large seeds are eaten by pigs, and they have been used locally (taken internally) as a remedy for leprosy. The bark is employed as a substitute for soap.

The tree is figured by Hernández[1] and described in a chapter entitled "De Copalxochotl, seu arbore Gummosa pruniformi." He gives the Tarascan name as "pompoqua," and reports that the plant was used in Michoacán for fevers, diarrhea, and dysentery.

2. Cyrtocarpa edulis (T. S. Brandeg.) Standl.

Tapirira edulis T. S. Brandeg. Zoe **5**: 78. 1900.

Southern Baja California.

Tree, 7 to 9 meters high, with a trunk 15 to 30 cm. in diameter; leaflets rounded or very obtuse at apex, opposite, subsessile, the rachis terete; flowers white; fruit 1.5 to 2 cm. long, yellow, velvety-pubescent. "Ciruela."

The fruit has an acid flavor; on some trees it is pleasant to the taste but on others bitter (perhaps because immature). It is much eaten by the people of Baja California, and the stones are eaten by various animals. This is probbly the "ciruelo" described by Clavigero (Historia de la California). For an illustration of the tree see Contr. U. S. Nat. Herb. **16**: *pl. 119.*

4. ANACARDIUM L. Sp. Pl. 383. 1753.

1. Anacardium occidentale L. Sp. Pl. 383. 1753.

Yucatán, Campeche, Chiapas, and Oaxaca. Central America, West Indies, and South America; naturalized in the tropics of the Old World.

Shrub or tree, 2.5 to 10 meters high; leaves obovate, petiolate, 9 to 15 cm. long, rounded at apex, glabrous; flowers polygamo-dioecious, in large terminal panicles; calyx 5-parted; petals 5, linear-lanceolate, 7 to 8 mm. long, puberulent outside; fruit reniform, 2 to 2.5 cm. long, borne on a large, thickened fleshy hypocarp. "Marañón" (Yucatán, Oaxaca, Guerrero, Cuba, El Salvador, Panama, Costa Rico, Peru); "jocote marañón" (Guatemala); "pajuil," "acaju" (Porto Rico); "caujil" (Venezuela); "merey" (Colombia, Venezuela); "casoy" (Philippines); "cacahuil," "cajuil" (Santo Domingo).

Specimens obtained at Acapulco by Palmer were taken from a cultivated tree said to have been brought from Panama, and the plant is probably not native so far north. The English name for the tree is "cashew" or "cashew-nut," and the French name is "acajou," although the latter belongs more properly to the mahogany.

The wood is close-grained, strong, and durable, the specific gravity being reported as 0.488. The flowers are green tinged with yellow or purple; they are sweet-scented and much frequented by bees. From the trunk there exudes a gum somewhat like gum arabic. This can be used for varnish, and in South America it is used for bookbinding in order to prevent the attacks of insects.

The most important products of the tree are the fruit and receptacles, both of which are edible. The receptacle is pear-shaped, very fleshy, and yellow or reddish; it is astringent when green, but when ripe has a pleasantly acid flavor. In Mexico sweetmeats are sometimes made from the receptacles, and in some parts of tropical America a kind of wine is made from them, and this after fermentation is distilled to obtain brandy.

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[1] Thesaurus 82. 1651.

The pericarp of the fruit proper contains an oil, cardol, which is acrid and caustic. This is driven off by heat, but the fumes which rise when the nuts are heated should not be allowed to reach the face or eyes. The roasted kernels are edible and have a pleasant milky flavor. The oil obtained from the nuts is applied in India to the floors and rafters of houses to preserve them from insects, but its use is dangerous. The ground kernels are sometimes used to flavor wine, and they are mixed with chocolate.

A decoction of the bark has been employed as a remedy for diarrhea, for syphilitic swellings of the joints, and for diabetes. The oil from the pericarp is sometimes used for ulcers, persistent skin diseases, and leprosy, and as an application to remove warts and freckles, but because of its caustic properties it must be employed with great caution.[1]

5. MANGIFERA L. Sp. Pl. 200. 1753.

1. Mangifera indica L. Sp. Pl. 200. 1753.

Widely cultivated in the warmer portions of Mexico and sometimes growing without cultivation. Native of Asia; cultivated in all tropical countries.

Tree, 10 to 15 meters high, with dense spreading crown; leaves petiolate, oblong-lanceolate, usually narrowly so, 10 to 20 cm. long, acute or cuspidate-acuminate, subcoriaceous, glabrous; flowers polygamous, whitish green, in large terminal panicles; sepals 5, 2.5 mm. long; petals 5, 5 mm. long; fertile stamens 1 or 2, but 3 or 4 staminodia present; fruit a drupe, 3 to 4 cm. long or much larger. Generally known in Spanish-speaking countries as " mango," which is the English name also.

The mango is one of the finest and most widely known of tropical fruits. It is said to have been introduced into Mexico at the beginning of the 19th century by Don Juan Antonio Gómez, a Spaniard living at Córdoba.[2] It has been introduced into Florida and California in comparatively recent years. The mango makes a fine shade tree. The leaves are evergreen and when crushed they emit an ordor of turpentine. Those of young branches are usually tinged with red or purple. The trees are most commonly grown from seeds, but the better varieties are propagated by budding or grafting.

The fruit is borne in the greatest profusion. Like most cultivated fruits, it varies greatly in size and quality. Some fruits weigh as much as 4 or 5 pounds, while others are no larger than plums. The shape varies from round to long and slender. The skin is smooth, usually yellow or greenish but often tinged with red. The flesh is juicy and often has a delightful fragrance. In some varieties it has a strong flavor of turpentine, but in the better forms this is wholly lacking. The large seed is covered with long, tough fibers which extend into the flesh, but in the best varieties there is no fiber. The mango is most commonly used as a dessert fruit, but it is often cooked or made into preserves, and various beverages are made from it. The unripe fruit is often pickled in India and used in various sauces and condiments. Alcoholic liquors are sometimes prepared from the ripe fruit.[3]

The wood is soft, brownish gray, with small spots and irregular lines of brown; its specific gravity is reported as 0.864. The seeds are said to possess anthelmintic and astringent properties. The bark also is astringent and is used locally for cutaneous diseases, chronic diarrhea, and fevers, while the gum

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[1] See Mariano Bárcena, El marañón: Sus caracteres y propiedades, su aclimatación en Jalisco, Naturaleza 1: 335.

[2] See Alcocer, Anal, Mus. Nac. Méx. II. 2: 431. 1905.

[3] For a full account of the mango, its culture, etc., see Popenoe in Bailey. Stand. Cycl., Hort. 1984–1989. 1916.

which exudes from the trunk is employed for the same purposes. The leaves and petioles are sometimes employed as brushes to cleanse the teeth and harden the gums, and even as a remedy for toothache. They are also used as a domestic remedy for affections of the chest and liver. For an illustration of the tree see Contr. U. S. Nat. Herb. **9**: *pl. 28.*

6. PISTACIA L. Sp. Pl. 1025. 1753.

Pistacia vera L., of the Mediterranean region and western Asia, furnishes the pistachio nuts of commerce, and is extensively cultivated for that purpose. Pistachio nuts are the seeds or kernels of a dry drupe; they are green and have a peculiar flavor. *P. lentiscus* L., also of the Mediterranean region, yields mastic or mastiche, an official drug, which is a resinous exudate from the branches. It was formerly used for debility of the stomach and chronic diarrhea, but is now seldom given internally. The gum is employed to fill cavities in the teeth and is chewed to sweeten the breath, and varnish is prepared from it. The seeds yield an oil, and the leaves are used for tanning. *P. terebinthus* L. is the Cyprus turpentine tree.

1. **Pistacia mexicana** H. B. K. Nov. Gen. & Sp. **7**: 22. *pl. 608.* 1825.

Coahuila and Tamaulipas to Guerrero and Chiapas; type from Chilpancingo, Guerrero. Western Texas; Guatemala.

Shrub or tree, sometimes 6 meters high; leaves pinnate; leaflets 11 to 29, mostly alternate, oblique-oblong, 1 to 2 cm. long, acute or obtuse, nearly glabrous; flowers small, dioecious, the pistillate ones in panicles 5 to 10 cm. long; stamens usually 5; fruit a nearly dry drupe, oblique, slightly compressed, 3 to 4 mm. long, purplish, glaucous. "Ramón" (Oaxaca); "lentisco" (Nuevo León, Oaxaca; sometimes corrupted into "lantrisco"); "yaga-guieguei" (Oaxaca, Zapotec, *Reko*); "almáciga" (the resin; Oaxaca).

A resin exudes from the branches. The seeds are edible. The specimens from northeastern Mexico have comparatively few leaflets, but some specimens from southern Mexico also have fewer than the typical form. The form occurring in Texas and northeastern Mexico has been described recently as a new species, *Pistacia texana* Swingle,[1] but it does not appear to the writer to deserve specific rank, since it is impossible to find any definite character by which it can be separated from typical *P. mexicana.*

7. SCHINUS L. Sp. Pl. 388. 1753.

1. **Schinus molle** L. Sp. Pl. 388. 1753.

Widely cultivated in Mexico and often growing without cultivation. Native of Peru and occurring elsewhere in South America.

Tree, often 15 meters high or larger, with spreading crown and graceful drooping branches; leaves pinnate, the rachis marginate; leaflets 15 to 27, sessile, linear-lanceolate, acute, entire or nearly so; flowers small, yellowish white, in large panicles; petals 5, oblong; stamens 10; fruit drupaceous, globose, 5 mm. in diameter, rose-red. "Arbol del Perú," "Perú," "Pirul," "molle," "pimienta de América" (various parts of Mexico); "pelonquahuitl," "copalastle" (fruit), "copalquahuitl" (Nahuatl); "ttzacthunni," "ttzacthûmi," "xâza" (Otomí, *Buelna*); "pimiento," "muelle" (Colombia); "pimiento de California" (Costa Rica); "pimentero" (Chile).

The pepper-tree (sometimes known also as "California pepper-tree") is very commonly planted as a shade tree in some parts of Mexico, especially in the Valley of Mexico, and is grown abundantly in southern California. The

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[1] Journ. Arn. Arb. **2**: 107. 1920.

tree ascends in the Andes to an altitude of 3,600 to 3,900 meters, but often occurs at much lower altitudes. It thrives in dry, sandy soil and can endure extended drought. The pepper-tree is said to have been introduced into Mexico by Don Antonio de Mendoza, the first viceroy, who sent the seeds from Peru. The specific name, *molle*, is the name by which the tree is known in western South America, and is derived from *mulli*, the old Peruvian name.

Schinus molle is an excellent shade tree and a handsome one, remaining green throughout the year. The only objection to it is the fact that it harbors the black scale, which is a serious pest of citrus fruits. The wood is useful for various purposes and the bark for tanning skins. When fragments of the leaves are placed in water they execute quick jerking movements, due to the sudden discharge of the oil which they contain. The fruit contains a volatile oil, and has a flavor resembling that of a mixture of fennel and pepper. The seeds are sometimes used to adulterate pepper. In Mexico the fruit is ground and mixed with *atole* or other substances to form beverages. An intoxicating liquor, known as "copalocle" or "copalote" is obtained by fermenting the fruit with pulque for one or two days.

The pepper-tree is much used in local medicine. The powdered bark or its decoction is used as a remedy for swollen feet and as a purgative in domestic animals; it is reported to have astringent and balsamic properties. The gum which exudes from the trunk is bluish white, acrid, and bitter, and burns with a pleasant odor. It is often chewed as a chewing gum, and is said to have purgative and vulnerary properties. It is applied in Mexico in the form of an emulsion to the eyes to hinder the development of cataracts, and is used for genito-urinary and venereal diseases. The leaves are chewed to harden the gums and to heal ulcers of the mouth. The fruit has been used by European physicians as a substitute for cubeb in the treatment of gonorrhoea, and a syrup prepared with it is used in Mexico for bronchitis.[1] The tree is figured and described by Hernández.[2]

8. ASTRONIUM Jacq. Enum. Pl. Carib. 10. 1760.

1. **Astronium conzattii** Blake, Contr. Gray Herb. n. ser. **53**: 59. 1918.

Astronium zongolica Reko, El México Antiguo **1**: 157. 1918.

Known only from the type locality, Cafetal Concordia, Pochutla, Oaxaca, altitude 600 meters.

Leaves alternate, pinnate; leaflets 9 or 11, ovate, 3.5 to 5.3 cm. long, 1.5 to 2.5 cm. wide, acuminate, obscurely serrulate, pilosulous beneath; flowers dioecious, paniculate, the panicles glabrous, 1 cm. long; sepals 5; petals 5, yellow, 2.5 mm. long. "Zongolica," "sangolica"; "yaga-biche" (Zapotec).

9. COMOCLADIA L. Syst. Nat. ed. 10. 861. 1756.

Trees or shrubs; leaves pinnate, the leaflets entire or irregularly dentate; flowers small, perfect or polygamous, in large axillary panicles; calyx usually 3 or 4-parted; petals 3 or 4, deltoid-ovate, imbricate, spreading; stamens 3 or 4; fruit drupaceous, the endocarp membranaceous.

The juice of all the species is extremely poisonous, causing swelling of the parts affected and blisters upon the skin. That of some species has been used in the West Indies to cure ringworm and destroy warts, but its use is dangerous. The species of Santo Domingo and their properties are described by Oviedo (Lib. IX, Cap. XXXIII), under the name "guao." "The Indian women

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[1] See M. G. Jiménez, El árbol del Perú, Naturaleza **2**: 217.

[2] Thesaurus 54–55. 1651.

of Hispaniola," he states, "some of them who are willing to endure suffering to improve their appearance, since they are envious of the white women of Spain, take the roots of the *guao* and roast them carefully; and after they are well cooked and soft they rub them between their hands into a sort of paste; with this they anoint the face and neck and whatever part of the body they wish to whiten, and over this they place other ointments of herbs and comforting juices, in order that the *guao* may not cook them alive, or that they may endure it; at the end of nine days they take off all this coating and wash, and they are now as changed and white as if they were born in Castile."

Comocladia acuminata DC.[1] was assigned erroneously to Mexico by De-Candolle and Hemsley. It is a Porto Rican plant.

Leaflets glabrous beneath or sparsely pubescent.
  Leaflets broadly rounded or truncate at base.....1. C. palmeri.
  Leaflets, at least the upper ones, cuneate at base.....2. C. repanda.
Leaflets densely pilose beneath.
  Lateral nerves of the leaflet 6 to 8 pairs.....3. C. mollissima.
  Lateral nerves 12 to 17 pairs.....4. C. engleriana.

1. Comocladia palmeri Rose, sp. nov.

Colima and Guerrero; type from Acapulco (*Palmer* 450; U. S. Nat. Herb., no. 266344).

Leaflets 9 to 13, oblong-oval, 5 to 9 cm. long, glabrous above, glabrous or sparsely pubescent beneath, shallowly sinuate-dentate, with 7 to 12 pairs of lateral nerves; panicles 14 to 30 cm. long, hirtellous or glabrate.

2. Comocladia repanda Blake, Contr. Gray Herb. n. ser. **53**: 58. 1918.

Oaxaca; type from Cafetal Concordia, Pochutla, altitude 600 meters.

Leaflets usually 9, cuneate-obovate, elliptic, or elliptic-oblong, 5 to 11 cm. long, obscurely sinuate or repand-dentate, soon glabrous on both surfaces; panicles about 30 cm. long; flowers 4-parted; petals 1.5 mm. long. "Tetlate," "tatatil," "tatatián" (from the Nahuatl, *tle-tlati*, "burning fire"); "hincha huevos."

3. Comocladia mollissima H. B. K. Nov. Gen. & Sp. **7**: 17. *pl. 607*. 1825.

Guerrero to Chiapas; type collected between Acapulco and Venta del Exido.

Tree, about 4 meters high; leaflets 9 to 17, 1.5 to 2.5 cm. long, 1 to 1.5 cm. wide, obtusely dentate; panicles 10 to 25 cm. long, densely pubescent; flowers 4-parted.

4. Comocladia engleriana Loesener, Bull. Herb. Boiss. **3**: 615. 1895.

Sinaloa to Morelos and Oaxaca; type from Morelos.

Leaflets 13 to 21, elliptic to broadly oval-oblong, 5 to 13 cm. long, sinuate or remotely repand-dentate; panicles 7 to 35 cm. long, densely pubescent; flowers 4-parted; petals 1.5 mm. long. "Teclatilla" (Morelos, *Seler*); "hincha-huevos" (Sinaloa).

It is probable that this is only a form of *C. mollissima*. The specimens of *Comocladia* at hand are mostly imperfect and quite inadequate for a thorough investigation of the relationships of the species. *C. englerinana integra* Loes., described from Guatemala, is known by the vernacular names "chinil-té" and "pata de pava," according to Seler. It is said to have handsome red wood.

It is presumably one of the species of *Comocladia* which is described by Hernández[2] in his chapter entitled "De Tetlatia, seu urenti arbore."

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[1] Prodr. **2**: 65. 1825.

[2] Thesaurus 98. 1651.

10. METOPIUM P. Br. Civ. Nat. Hist. Jam. 177. 1756.

1. **Metopium brownei** (Jacq.) Urban, Symb. Antill. **5**: 402. 1908.
Rhus metopium L. Syst. Nat. ed. 10. **2**: 964. 1759.
Terebinthus brownei Jacq. Enum. Pl. Carib. 18. 1760.
Veracruz and Yucatán. Greater Antilles.
Shrub or tree, sometimes 15 meters high, the bark thin, reddish brown; leaflets 3 to 7, long-petiolulate, suborbicular or obovate, 3 to 8 cm. long, usually rounded at apex, glabrous; flowers small, in large axillary panicles; sepals 5; petals 5, yellowish green; stamens 5; fruit a drupe, orange-yellow, about 1 cm. long; wood weak, dark brown, its specific gravity about 0.80. "Cochinilla" (Santo Domingo).
The tree is very poisonous, resembling *Rhus radicans* in its effects.

11. MOSQUITOXYLUM Krug & Urb. Notizbl. Bot. Gart. Berlin 1: 78. 1895.

1. **Mosquitoxylum jamaicense** Krug & Urb. Notizbl. Bot. Gart. Berlin **1**: 78. 1895.
Chiapas. Panama; Jamaica (type locality).
Tree; leaves alternate, persistent, pinnate; leaflets 11 to 17, petiolulate, obovate-elliptic or obovate-oblong, 5 to 7.5 cm. long, entire, rounded or obtuse at apex, minutely appressed-pilose beneath or glabrate; flowers dioecious, 5-parted, in large panicles; fruit drupelike, somewhat compressed, about 8 mm. long.
The fruit is described by Urban as capsular, but its dehiscence is not apparent in any of the several specimens seen by the writer. In Jamaica the wood, known as "mosquito-wood," is valued for building purposes.

12. PSEUDOSMODINGIUM Engl. Bot. Jahrb. Engler 1: 419. 1881.

Shrubs or small trees; leaves pinnate, the leaflets entire or toothed; flowers small, paniculate or subracemose, dioecious; calyx 5-lobed; petals 5, oblong-ovate, imbricate; stamens 5; fruit a drupe, sessile, compressed, subdidymous or reniform, glabrous.

Leaflets suborbicular to rounded-ovate or obovate, 1.5 to 4.5 cm. wide.
Leaflets sessile ..... **1. P. virletii.**
Leaflets on petiolules 1 to 2.5 cm. long ..... **2. P. perniciosum.**
Leaflets lanceolate or linear-lanceolate, 3 to 10 mm. wide.
Leaflets about 7 pairs ..... **3. P. andrieuxii.**
Leaflets 11 to 15 pairs ..... **4. P. multifolium.**

1. **Pseudosmodingium virletii** (Baill.) Engl. Bot. Jahrb. Engler **1**: 419. 1881.
Smodingium virletii Baill. Adansonia **11**: 182. 1874.
Known only from the type locality, in the State of San Luis Potosí.
Leaflets 6 pairs, rhombic-obovate, 1.5 to 2 cm. long, rounded at apex; panicles nearly equaling the leaves; calyx glabrous.

2. **Pseudosmodingium perniciosum** (H. B. K.) Engl. Bot. Jahrb. Engler **1**: 420. 1881.
Rhus perniciosa H. B. K. Nov. Gen. & Sp. **7**: 10. 1825.
Rhus pterocarpus Sessé & Moc. Pl. Nov. Hisp. 47. 1887.
Michoacán and Guerrero; reported from Morelos and Querétaro; type from Santa Teresa and Tepecoacuilco, Guerrero.
Small tree, glabrous throughout; leaflets 9 to 11, 3 to 5.5 cm. long, rounded to abruptly acuminate at apex, pale green; panicles equaling or shorter than the leaves; petals 1.5 mm. long; fruit lustrous, about 8 mm. long and 10 mm.

broad. "Cuajiote'" (Michoacán, Morelos); "copaljiote" (Michoacán, Morelos); "cuajiote blanco" (Morelos, Querétaro); "xiote" (*Sessé & Mociño*).

The plant is very poisonous, acting much like *Rhus radicans*. The gum which exudes from the trunk is said to have purgative properties, and it is also rubbed upon the skin to reduce the pain of scorpion stings. An excellent figure of the plant, but without description, is given by Hernández,[1] under the name "quauxiotl."

3. **Pseudosmodingium andrieuxii** (Baill.) Engl. Bot. Jahrb. Engler **1**: 419. 1881.

Smodingium andrieuxii Baill. Adansonia **11**: 182. 1874.

Described from southern Mexico, the locality not known.

Leaflets elongate-lanceolate, sessile, 3 to 3.5 cm. long, sharply serrate, glabrous; panicles half as long as the leaves; pedicels 6 to 7 mm. long; fruit 6 mm. long, 10 mm. wide.

4. **Pseudosmodingium multifolium** Rose, Contr. U. S. Nat. Herb. **5**: 143. *f. 6.* 1897.

Hidalgo, Puebla, and Oaxaca; type from the city of Oaxaca.

Shrub or small tree, 2.5 to 6 meters high, glabrous; leaflets lanceolate, sessile, 1.5 to 3 cm. long, serrate to entire; panicles equaling or shorter than the leaves; fruit about 8 mm. long and 10 mm. broad. "Yaga-lache" (Oaxaca, Zapotec, *Reko*).

13. RHUS L. Sp. Pl. 265. 1753.

Shrubs or trees; leaves alternate, simple, trifoliolate, or pinnate, the leaflets entire, toothed, or lobed; flowers small, polygamous, in large or small, axillary and terminal panicles; sepals 5, imbricate; petals 5, imbricate; stamens 5; fruit a drupe, glabrous or pubescent.

The genus is divided by some authors into several genera. *Rhus coriaria* L., of the Mediterranean region, is much used for tanning and dyeing. *R. vernicifera* DC. and *R. succedanea* L., of eastern Asia, exude from their stems a substance known as lac, which furnishes the most durable varnish known.

Rhus copallina L., a species of the eastern United States, has been reported erroneously from Mexico.

Leaves simple.
- Fruit glabrous ..... **1. R. laurina.**
- Fruit pubescent.
  - Leaves with rounded lobes ..... **12. R. trilobata.**
  - Leaves entire or with acute teeth.
    - Leaves pilose beneath with short spreading hairs ..... **2. R. mollis.**
    - Leaves glabrous beneath, or the pubescence of appressed hairs.
      - Leaves acute, ovate, glabrous ..... **3. R. ovata.**
      - Leaves obtuse or rounded at apex, not ovate.
        - Leaves mostly about as broad as long, densely covered beneath with minute white appressed hairs ..... **4. R. lentii.**
        - Leaves much longer than broad, glabrous beneath or with sparse appressed hairs ..... **5. R. integrifolia.**

Leaves compound.
- Fruit glabrous.
  - Leaflets usually 11 or 13 ..... **6. R. juglandifolia.**
  - Leaflets 3.
    - Leaflets entire or dentate ..... **7. R. radicans.**
    - Leaflets deeply lobed ..... **8. R. eximia.**

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[1] Thesaurus 406. 1651.

Fruit pilose.
Leaflets small, 5 to 10 mm. long_____9. **R. microphylla.**
Leaflets large, most of them more than 20 mm. long.
Bracts of the inflorescence lanceolate or ovate-lanceolate.
Leaflets pinnately lobed, densely tomentose beneath.
10. R. potentillaefolia.
Leaflets serrate, glabrous or nearly so beneath_____**11. R. glabra.**
Bracts orbicular or broadly ovate.
Leaves deciduous; leaflets always 3_____**12. R. trilobata.**
Leaves persistent; leaflets 5 or more in all or most of the leaves.
Leaflets thick-coriaceous, very lustrous on the upper surface.
Leaflets 5 or 7, rarely 9.
Leaflets acute or acuminate.
Lateral leaflets 2 to 3 cm. long_____**13. R. andrieuxii.**
Lateral leaflets 4 to 10 cm. long.
Leaflets copiously hirtellous beneath_____**14. R. oaxacana.**
Leaflets sparsely puberulent or glabrous beneath.
15. R. ciliolata.
Leaflets rounded to obtuse at apex, very rarely acute.
16. R. virens.
Leaflets 9 or more in all or most of the leaves.
Margins of the leaflets strongly revolute__**17. P. pachyrrhachis.**
Margins of the leaflets not revolute or scarcely so.
18. R. schiedeana.
Leaflets comparatively thin, dull on the upper surface or scarcely lustrous.
Laterals leaflets short-petiolulate or nearly sessile.
19. R. terebinthifolia.
Lateral leaflets long-petiolulate.
Leaflets usually 11 to 15, 1.5 to 2.5 cm. long__**20. R. jaliscana.**
Leaflets 7 or 9, 3.5 to 7 cm. long_____**21. R. barclayi.**

1. **Rhus laurina** Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 219. 1838.
Lithraea laurina Walp. Repert. Bot. **1**: 551. 1842.
Baja California. Southern California; type from Santa Barbara.
Shrub or small tree, sometimes 4.5 meters high, with a broad top, glabrous throughout; leaves evergreen, long-petiolate, oblong or lanceolate, 7 to 12 cm. long, mucronate, rounded or cordate at base, pale beneath; flowers white or yellowish, in large terminal panicles; fruit 3 to 4 mm. long, whitish.
The plant has the odor of bitter almonds. The seeds yield a pungent oil.

2. **Rhus mollis** H. B. K. Nov. Gen. & Sp. **7**: 10. *pl. 602*. 1825.
Querétaro, Hidalgo, Puebla, and Oaxaca; type from Querétaro.
Shrub or small tree, 1.5 to 4.5 meters high; leaves nearly sessile, thick-coriaceous, broadly ovate or oval, 3 to 7 cm. long, rounded at apex, usually cordate at base, densely velutinous on the upper surface; inflorescence short and dense; petals 4 mm. long; fruit 7 to 8 mm. in diameter. "Zumaque" (Oaxaca, Quarétaro, Hidalgo); "tnu-ndé," "yucu-caya" "sumaco," "sumaco cimarrón" (Oaxaca, *Seler*).

3. **Rhus ovata** S. Wats. Proc. Amer. Acad. **20**: 358. 1885.
Neostyphonia ovata Abrams, Bull. N. Y. Bot. Gard. **6**: 403. 1910.
Northern Baja California. California and southern Arizona.
Shrub; leaves petiolate, thick-coriaceous, broadly ovate, 5 to 8 cm. long, lustrous, entire; inflorescence short and dense, puberulent; flowers pink or white; fruit about 8 mm. in diameter.

The fruit is covered by a sweet waxy exudate which was used by some of the Indians as a substitute for sugar. The flowers are said to yield a good quality of honey. The flower clusters were boiled and eaten by the Coahuilla Indians of California, and a decoction of the leaves was employed as a remedy for coughs and for pains in the chest.

4. **Rhus lentii** Kellogg, Proc. Calif. Acad. **2**: 16. 1863.

Coast of Baja California, and on the adjacent islands; type from Cedros Island.

Shrub, 1.5 to 2 meters high; leaves thick-coriaceous, short-petiolate, orbicular or rounded-ovate, 2 to 5 cm. long, pale on both surfaces, rounded or subcordate at base; inflorescence rather lax, finely puberulent; flowers white or crimson; fruit about 1 cm. in diameter, appearing as if covered with icing.

5. **Rhus integrifolia** (Nutt.) Benth. & Hook.; S. Wats. in Wheeler, Rep. U. S. Surv. 100th Merid. **6**: 84. 1878.

Styphonia integrifolia Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 220. 1838.

Rhus hindsiana Engl. in DC. Monogr. Phan. **4**: 388. 1883.

Neostyphonia integrifolia Shafer in Britton, N. Amer. Trees 612. 1908.

Baja California. Southern California; type from San Diego.

Shrub or tree, sometimes 10 meters high, with a trunk a meter in diameter, but usually much smaller; leaves coriaceous, short-petiolate, oval, 5 to 8 cm. long, obtuse or rounded at base, entire or spinose-dentate; inflorescence short and dense; flowers pink; fruit 1 to 1.5 cm. long, covered with short red hairs; wood hard, bright red, its specific gravity about 0.78.

Sometimes known in California as "lemonade-berry," the fruit being used in the preparation of a cooling drink. The shrub forms dense thickets along coastal cliffs, but it grows inland also. The wood is used for fuel. The fruit is covered with an icy-appearing white substance, and has a pleasant flavor.

6. **Rhus juglandifolia** Willd.; Roem. & Schult. Syst. Veg. **6**: 649. 1820.

Rhus lindeniana Turcz. Bull. Soc. Nat. Moscou **31**[1]: 468. 1858.

Rhus juglandifolia lindeniana Engl. in DC. Monogr. Phan. **4**: 401. 1883.

Veracruz, Oaxaca, and Chiapas. Central America to Venezuela and Peru; type from Colombia.

Tree or large shrub; leaflets 11 to 15, oblong or narrowly oblong, 7 to 15 cm. long, acute or cuspidate-acuminate, thin, pubescent or glabrous beneath; panicles 15 to 30 cm. long; petals 2 to 3 mm. long, white; fruit about 8 mm. in diameter. "Yagalache" (Oaxaca, Zapotec); "hinchador" (Costa Rica); "birringo," "Pedro Hernández," "fresno," "alicito," "manzanillo," "caspi" (Colombia).

Painful swelling and blistering of the skin is caused by contact with the plant. In Colombia the remedy employed for this is yuca starch, applied as a poultice to the parts affected. This is presumably the species reported by Sessé and Mociño[1] as *R. succedanea.*

7. **Rhus radicans** L. Sp. Pl. 266. 1753.

Rhus toxicodendron L. Sp. Pl. 266. 1753.

Toxicodendron vulgare Mill. Gard. Dict. ed. 8. *Toxicodendron* no. 1. 1768.

Rhus tridentata Sessé & Moc. Pl. Nov. Hisp. 47. 1887.

Toxicodendron radicans Kuntze, Rev. Gen. Pl. **1**: 153. 1891.

Toxicodendron divaricatum Greene, Leaflets **1**: 122. 1905.

Baja California to Nuevo León, Veracruz, Yucatán, and Oaxaca. United States and Canada; eastern Asia.

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[1] Pl. Nov. Hisp. 47. 1887.

Low shrub or often a large woody vine, the stems clinging to trees by aerial roots; leaves deciduous, the 3 leaflets ovate or rhombic, 5 to 12 cm. long, acute or acuminate, entire or irregularly dentate, pubescent or nearly glabrous; flowers green, in loose axillary panicles; fruit globose, 3 to 5 mm. in diameter. "Chechen" (Yucatán, *Urbina*); "hiedra" (Sinaloa, Nuevo León, Tamaulipas, Durango); "mala mujer" (Veracruz, Jalisco, San Luis Potosí); "mexye" (Otomí, *Buelna*); "guardalagua" (Jalisco); "hinchahuevos" (Veracruz); "bemberecua" (Michoacán, Tarascan); "guau" (*Ramírez*); "hiedra mala" (Michoacán). The English name is "poison ivy."

The species is a variable one, as might be expected from its wide range, and many segregates have been described, but it is impossible to determine their value until the group has been studied more critically than has been attempted heretofore. Both the dwarf and the scandent forms occur in Mexico.

Poison ivy and its effects are well known throughout the range of the plant. All parts contain a nonvolatile oil, toxicodendrol, which is the active principle. Contact with the plant, or even one's presence in its vicinity if it is covered with dew, produces painful swelling of the parts affected and an eruption of the skin. Some persons are very susceptible to the poisonous effects of the plant, while others are not affected at all. Those who are immune may, it is said, later become susceptible to it. Poisoning by the plant is painful and ofter dangerous, especially if the eyes are affected. Many remedies have been suggested, the most widely used, perhaps, being the application of an alcoholic solution of lead acetate. An extract of *Grindelia* (family Asteraceae) has been used successfully. In Mexico various remedies are reported, among them being a decoction of *Heimia salicifolia* and *Lobelia fulgens* ("cresta de gallo").[1]

The leaves were formerly official in the U. S. Pharmacopoeia. The juice is milky and turns black on exposure to air; upon linen it leaves an indelible stain. The plant has been used as a local irritant, but is no longer employed. A tincture is used by homeopathic practitioners as a remedy for rheumatism.

The plant is mentioned by Clavigero (Historia de la California, 1789) under the name "hiedra maligna."

8. Rhus eximia (Greene) Standl.

Toxicodendron eximium Greene, Leaflets **1**: 123. 1905.

Durango, Nuevo León, and Tamaulipas; type collected near the city of Durango.

Low shrub; leaflets rhombic, 4 to 9 cm. long, usually 3-lobed, the lobes again shallowly lobed, densely pubescent beneath or glabrate. "Hiedra" (Tamaulipas).

Perhaps only an extreme form of *R. radicans*. The type is densely pubescent, and a Tamaulipas specimen referred here is glabrate. The latter may represent a distinct species.

9. Rhus microphylla Engelm.; A. Gray, Pl. Wright **1**: 31. 1852.

Rhoeidium microphyllum Greene, Leaflets **1**: 143. 1905.

Rhoeidium retusum Greene, Leaflets **1**: 144. 1905.

Rhoeidium potosinum Greene, Leaflets **1**: 144. 1905.

Rhoeidium cinereum Greene, Leaflets **1**: 144. 1905.

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[1] For a very full account of the poisonous properties of the plant and of the remedies which have been suggested (over 200 of them), see W. L. McAtee, An account of poisonous sumachs, *Rhus* poisoning, and remedies therefor, Medical Record (New York), May 8, 1920; see also E. P. Smith, Plant dermatitis, Journ. Bot. Brit. & For. **58**: 130–135. 1920.

Sonora to Coahuila and Zacatecas. Western Texas to southern Arizona; type from Texas.

Densely branched shrub, 1 to 2 meters high; leaflets 5 to 9, oblong to oval, rounded or obtuse at apex, mucronulate, pilose-strigose; rachis winged; inflorescence short and dense; petals 3 mm. long; fruit 6 to 7 mm. in diameter, red. "Correosa" (Coahuila, Durango, Texas); "agritos" (Chihuahua; fruit); "agrillo" (Durango, *Patowi*).

The fruit is edible, but it is sour and not very palatable.

10. Rhus potentillaefolia Turcz. Bull. Soc. Nat. Moscou **31**[1]: 469. 1858.

Guerrero, Puebla, and Oaxaca; type from Oaxaca.

Shrub or tree, 4.5 to 7.5 meters high; leaflets 13 to 21, oblong or narrowly oblong, 1.5 to 7 cm. long, deeply sinuate-lobed, rugose, densely pubescent on both surfaces, sessile; panicles much shorter than the leaves; petals 2 mm. long; fruit about 6 mm. in diameter, covered with very long soft reddish hairs.

A plant of striking appearance, quite unlike any other species of the genus.

11. Rhus glabra L. Sp. Pl. 265. 1753.

Mountains of Chihuahua. Widely distributed in the United States and Canada.

Shrub, or sometimes a tree 6 or 7 meters high, with smooth gray bark; leaflets 11 to 31, oblong or lance-oblong, 5 to 10 cm. long, acuminate, glabrous, pale beneath; flowers greenish, in dense terminal panicles; fruit covered with short red hairs.

The white sumac is a handsome plant when loaded with ripe fruit. The leaves turn red in autumn. The bark and leaves are much used in the United States for tanning and dyeing, the leaves containing from 15 to 27 per cent of tannin. The roots also yield a yellow dye. The dried leaves were smoked by many of the Indians, alone or mixed with tobacco. The fruit is edible; it is acidulous and contains malic acid. The dried fruit is official in the U. S. Pharmacopoeia, its decoction or fluid extract being astringent and refrigerant and employed as a gargle for sore throat and for other purposes. The Pawnee Indians employed a decoction of the fruit for dysmenorrhoea and dysentery and a decoction of the roots for urinary troubles.

12. Rhus trilobata Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 219. 1838.

Rhus schmidelioides Schlecht. Linnaea **16**: 482. 1842.

?*Rhus crenatifolia* Schlecht. Linnaea **16**: 483. 1842.

Schmaltzia trilobata Small, Fl. Southeast. U. S. 728. 1903.

Schmaltzia glauca Greene, Leaflets **1**: 138. 1905.

Schmaltzia scaberula Greene, Leaflets **1**: 138. 1905.

Schmaltzia ribifolia Greene, Leaflets **2**: 156. 1911.

Baja California to Chihuahua, Guanajuato, Hidalgo, and Colima. Western United States.

Shrub, 1 to 2.5 meters high; leaflets mostly rhombic, 1.5 to 5 cm. long, irregularly lobed and crenate, beneath densely pubescent or glabrate, the leaflets all essentially sessile; inflorescence short and dense; flowers greenish yellow; fruit 5 to 6 mm. in diameter, bright red. "Agrillo" (Durango); "lemita" (New Mexico). The most common English name is "skunkbush."

The species is an extremely variable one in pubescence and leaf form, and many segregates have been proposed. Few, if any, of these can be recognized as species, for the characters seem to intergrade in every direction. The most remarkable form of the species is that with simple leaves, which, in Mexico, is known only from Baja California. Specimens from that region were named *Schmaltzia ribifolia* Greene, but the form has received several earlier names. Simple and trifoliolate leaves are often found upon the same plant.

The wood was used by the Indians for bows. The dark red branches are a favorite article among many tribes for the manufacture of baskets. The fruit is sour and was eaten by the Indians, sometimes after having been preserved by drying. The fruit is often soaked in water with sugar to form a refreshing drink.

13. **Rhus andrieuxii** Engl. in DC. Monogr. Phan. 4: 389. 1883.

Oaxaca; described from southern Mexico, the localities not known.

Leaflets 5 or 7, broadly ovate, 1.5 to 2.5 cm. wide, pale and short-pubescent beneath; panicles slightly shorter than the leaves, the bracts ovate, acute.

14. **Rhus oaxacana** Loesener, Bull. Herb. Boiss. II. 6: 834. 1906.

Oaxaca; type collected between San Martin and Tlaxiaco.

Leaflets 3 to 7, ovate to lance-oblong, the lateral ones petiolulate, entire, pubescent on both surfaces; panicles terminal and axillary, dense; petals 4 mm. long; fruit red, 6 to 8 mm. in diameter.

This may be only a pubescent form of *R. ciliolata.*

15. **Rhus ciliolata** Turcz. Bull. Soc. Nat. Moscou 31[1]: 470. 1858.

Puebla and Oaxaca.

Leaflets 3 or 5, long-petiolulate, ovate or oblong-ovate, nearly glabrous in age, paler beneath and conspicuously reticulate-veined; panicles axillary, lax, half as long as the leaves or shorter, the branches short-hirtellous.

16. **Rhus virens** Lindh.; A. Gray, Bost. Journ. Nat. Hist. 6: 159. 1850.

Rhus sempervirens Scheele, Linnaea 23: 556. 1850.

Sonora to Coahuila, San Luis Potosí, Zacatecas, and Durango; reported from Hidalgo; specimens from Puebla may belong here. Western Texas (type from New Braunfels) and southeastern New Mexico.

Shrub or small tree, 1 to 6 meters high; leaflets 5 or 7, short-petiolulate, oblong-elliptic, oblong-ovate, ovate, or obovate, 2 to 5 cm. long, glabrate, paler beneath; panicles axillary and terminal, usully shorter than the leaves; petals 3.5 mm. long; fruit red or orange, 6 to 8 mm. in diameter. "Capulín" (Durango, *Patoni*); "lambrisco" (San Luis Potosí, *Urbana*); "lantrisco" (Tamaulipas, *Palmer;* a corruption of "lentisco").

The leaves were smoked by the Indians of Texas, either alone or mixed with tobacco. It is probably this species (it may be *R. glabra*) of which Berlandier writes,[1] as follows: "The *Ayumé* abounded everywhere along the road, in the bottoms of the valleys, and along the beds of the arroyos; it is a small shrub 6 to 12 feet high; its appearance is that of the plants of the family Terebinthaceae. The inhabitants of Texas call it *Ayumé*, and the Comanches, who smoke it, know it under the name of *Temaichia.* The savages gather its leaves generally in the autumn, these being then red and very sharp; to preserve them they dry them by the fire or in the sun, and to smoke them they mix them with tobacco. The fruits are arranged in pyramidal racemes, rounded in form, red, oblong, and slightly acid. It is said that in Santa Fe, New Mexico, they make vinegar of the fruits of another species of *Ayumé.*"

17. **Rhus pachyrrhachis** Hemsl. Biol. Centr. Amer. Bot. 1: 218. 1880.

San Luis Potosí.

Shrub or small tree; leaflets 7 to 13, oblong-oval to lance-oblong, 2 to 5 cm. long, rounded or obtuse at apex, sessile or nearly so, densely velutinous on both surfaces; panicles short, open; fruit red, 6 to 8 mm. in diameter. "Lantrisco" (*Palmer*).

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[1] Diario de viage de la Comisión de Límites, p. 257. 1850.

18. Rhus schiedeana Schlecht. Linnaea **16**: 480. 1842.

Baja California to San Luis Potosí, Puebla, and Chiapas; type from Barranca de Santa María, Hidalgo.

Leaflets 9 to 13, oblong, lance-oblong, or lanceolate, 2 to 7 cm. long, long-petiolulate, usually acute or acuminate, paler beneath, glabrate or densely pubescent; panicles lax or dense, 5 to 20 cm. long, puberulent; petals 3 mm. long; fruit 6 to 8 mm. in diameter.

The material at hand is variable, especially in pubescence, and may represent more than one species. The single Baja California specimen is rather imperfect, but it seems to belong here.

19. Rhus terebinthifolia Schlecht. & Cham. Linnaea **5**: 600. 1830.

Rhus rubifolia Turcz. Bull. Soc. Nat. Moscou **31**[1]: 470. 1858.

Rhus subcordata Turcz. Bull. Soc. Nat. Moscou **31**[1]: 470. 1858.

Rhus palmeri Rose, Contr. U. S. Nat. Herb. **1**: 95. 1891.

Sonora to Veracruz and Chiapas; type from Papantla, Veracruz. Guatemala.

Shrub, 1 to 2 meters high, or probably larger; leaflets 3 to 15, oblong to ovate or obovate, 2 to 6 cm. long, obtuse to acuminate, sparsely or densely puberulent or pilose beneath; panicles usually large and lax; petals 2 mm. long; fruit red or orange, 5 to 8 mm. in diameter. "Hierba de temazcal," "temazcal," "yaga-biche" (Oaxaca, *Reko*).

Reko reports that the Zapotecs of Oaxaca employ the plant in steam baths (*Temazcal*, a sweat-bath hut) as a remedy for rheumatism and syphilis, and as a preparation for parturition.

20. Rhus jaliscana Standl. Contr. U. S. Nat. Herb. **20**: 219. 1919.

Jalisco; type from the barranca near Guadalajara.

Slender shrub, 3 to 4.5 meters high; leaflets elliptic or elliptic-oblong, usually obtuse, appressed-pilose beneath; panicles large and open; fruit 5 to 7 mm. in diameter.

21. Rhus barclayi (Hemsl.) Standl. Contr. U. S. Nat. Herb. **20**: 218. 1919.

Rhus terebinthifolia barclayi Hemsl. Biol. Centr. Amer. Bot. **1**: 219. 1880.

Tepic to Guerrero; type from Acapulco, Guerrero.

Slender shrub; leaflets ovate or oblong-ovate, acute or acuminate, hispid-pilose beneath with subappressed hairs; panicles large and open, the branches puberulent; fruit about 6 mm. in diameter.

DOUBTFUL SPECIES.

RHUS SAXATILIS DC. Prodr. **2**: 71. 1825. Described from Mexico, the description based upon one of Sessé and Mociño's plates. The plant belongs to some other family.

14. PACHYCORMUS Coville, Cent. Dict. rev. ed. 6708. 1911.

1. Pachycormus discolor (Benth.) Coville, Cent. Dict. rev. ed. 6708. 1911.

Schinus discolor Benth. Bot. Voy. Sulph. 11. *pl. 9*. 1844.

Rhus veatchiana Kellogg, Proc. Calif. Acad. **2**: 24. 1863.

Veatchia cedrosensis A. Gray, Proc. Amer. Acad. **20**: 290. 1885.

Bursera pubescens S. Wats. Proc. Amer. Acad. **24**: 44. 1889.

Veatchia discolor T. S. Brandeg. Proc. Calif. Acad. II. **2**: 140. 1889.

On plains and mountain slopes, Baja California; type from Magdalena Bay.

Tree, 2 to 4.5 meters high, with very short trunk, the branches numerous, large and thick, usually very crooked and frequently lying upon the ground, often 6 meters long; bark thin, yellowish, peeling off in thin papery sheets, exposing the green under surface; leaves pinnate, soon deciduous; leaflets 3 to

15, 3 to 10 mm. long, oval or oblong, entire or crenate-lobate, puberulent; flowers dioecious, paniculate at the ends of the branches, yellowish, pink, or red; petals accrescent, 5 mm. long, acute; fruit shorter than the petals, pubescent. "Copalquín," "torote blanco."

A remarkable plant, the only species of the genus. It is leafless for most of the year. The wood is soft and porous and soon decays. The sap is milky and on exposure soon hardens into a gum or resin. Considerable quantities of the bark have been exported to Europe for use in tanning. For a more complete account of the tree, and illustrations, see Contr. U. S. Nat. Herb. **16**: 344–345. *pl. 118.* 1916.

80. JULIANIACEAE. Juliania Family.

Only one other genus of the family is known, *Orthopterygium* Hemsl., represented by a single Peruvian species.

1. AMPHIPTERYGIUM Schiede; Schlecht. Linnaea **17**: 635. 1843.

References: Hemsley & Rose, Diagnoses specierum generis *Juliania*, Schlecht., Americae tropicae, Annals of Botany **17**: 443–446. 1903; Hemsley, Phil. Trans. Roy. Soc. London B. **199**: 169–197. *pl. 18–24.* 1907; Alcocer, Las Julianáceas, Anal. Mus. Nac. Méx. II. 4: 318–327. 1907.

Trees or shrubs; leaves alternate, deciduous, pinnate or rarely simple, the leaflets opposite, toothed; flowers dioecious, the staminate small, in axillary panicles, the perianth 6 to 8-parted; stamens as many as the perianth segments; pistillate flowers consisting of only a pistil, usually in groups of 4 on a receptacle; fruit indehiscent, hardened, the fruiting pedicels flat and wing-like, becoming very large; seed 1.

Leaflets glabrous beneath and glaucous ---------- 1. **A. glaucum.**
Leaflets densely pubescent beneath, green.
  Leaflets usually 7 or 9, gradually acute or acuminate ---- 2. **A. amplifolium.**
  Leaflets 1 to 7, rounded, obtuse, or abruptly short-pointed at apex.
    Young leaflets densely villous ---------- 3. **A. molle.**
    Young leaflets thinly pilose or hirsute.
      Leaves 3 to 7-foliolate ---------- 4. **A. adstringens.**
      Leaves all or mostly simple -------- 4a. **A. adstringens simplicifolium.**

1. **Amphipterygium glaucum** Hemsl. & Rose, Annals of Botany **17**: 444. 1903.
   Juliania glauca Hemsl. & Rose, Annals of Botany **17**: 444. 1903.
   Known only from the type locality, Jilotlán, Michoacán.
   Leaflets 3 or 5, 3.5 to 7.5 cm. long, acute or abruptly acute, obtuse or cuneate at base, crenate; fruiting pedicels 3 to 5 cm. long, glaucous.

2. **Amphipterygium amplifolium** Hemsl. & Rose, Annals of Botany **17**: 444. 1903.
   Juliania amplifolia Hemsl. & Rose, Annals of Botany **17**: 444. 1903.
   Durango and Jalisco; type from barranca near Guadalajara, Jalisco.
   Small tree; leaflets lanceolate or ovate-lanceolate, 5 to 11 cm. long, coarsely serrate or crenate-serrate, densely pilose or in age glabrate; fruit puberulent or glabrate, 4 to 5.5 cm. long, the pedicel nearly 3 cm. broad.

3. **Amphipterygium molle** (Hemsl.) Hemsl. & Rose, Annals of Botany **17**: 444. 1903.
   Juliania mollis Hemsl. in Hook. Icon. Pl. **28**: *pl. 2722.* 1901.
   Known only from the type locality, barranca near Guadalajara, Jalisco.
   Leaflets 3 or 5, oblong to suborbicular, 2.5 to 5 cm. long, crenate-dentate or serrate.

4. **Amphipterygium adstringens** (Schlecht.) Schiede; Schlecht. Linnaea **17**: 635. 1843.

Hypopterygium adstringens Schlecht. Linnaea **17**: 635. 1843.

Juliania adstringens Schlecht. Linnaea **17**: 746. 1843.

Michoacán to Morelos, Puebla, and Oaxaca; type from Morelos.

Tree, 4 to 6 meters high; leaflets sessile or nearly so, most of them broadly obovate, 2 to 7 cm. long, serrate or crenate above the middle or sometime also below, rounded to cuneate at base; fruit 2.5 to 5 cm. long, puberulent or glabrate. "Quetchalalatl" (Michoacán (*Lumholtz*); "cuachalala," "cuauchalalá," "cuauchalalote," "cuauchalalate," "cuauchalalatl" (Nahuatl); "matixeran" (Michoacán, Tarascan, *Lumholtz*); "volador" (Puebla).

The bark is astringent and contains tannin. Its decoction is used to harden the gums and to cure old wounds, and it is said to be employed also as a remedy for malaria. The bark yields a red dye. This plant has been listed in some Mexican works as *Rajania subsarmata*.

4a. **Amphipterygium adstringens simplicifolium** Standl., subsp. nov.

Oaxaca; type from Playa de Salina Cruz, Distrito de Tehuantepec (*Conzatti* 3672; U. S. Nat. Herb. no. 989553).

Leaves simple, petiolate, the blades oval or rounded-ovate, 4 to 6.5 cm. long, rounded or obtuse at apex, rounded or subcordate at base, coarsely crenate, glabrate above, densely short-pilose beneath; fruit about 3 cm. long.

This may be a distinct species, but it is more probably only a leaf form, analogous to the forms of certain species of *Rhus* and *Elaphrium*. Two other specimens seen by the writer have simple leaves on some of the branches. The finding of a simple-leaved form in this genus is a matter of considerable interest, for it would seem to indicate a relationship with the Anacardiaceae and Burseraceae, groups to which the genus has been referred by most authors. Hemsley, however, considers the relationship of the family to be rather with the Juglandaceae.

81. CYRILLACEAE. Cyrilla Family.

1. CYRILLA L. Mant. Pl. 1: 5. 1767.

1. Cyrilla racemiflora L. Mant. Pl. 1: 50. 1767.

Cyrilla antillana Michx. Fl. Bor. Amer. 1: 158. 1803.

Oaxaca. Southern United States, West Indies, Guianas, and Brazil.

Shrub or tree, 2 to 10 meters high, the trunk sometimes 30 cm. in diameter, the branches widely spreading; bark thin, pale brown, breaking up into large scales; leaves alternate, leathery, obovate or oblanceolate, 3 to 11 cm. long, obtuse or acute, short-petiolate, entire, glabrous; flowers, perfect, white or pinkish, in lateral racemes; sepals 5; petals 5, about 3 mm. long, acute; stamens 5; fruit a 2-celled capsule, about 2.5 mm. in diameter; wood heavy and hard but weak, reddish brown, close-grained, its specific gravity about 0.68.

The names used in the United States and the British West Indies are "leather-wood," "ironwood," "burnwood," "red titi," and "white titi." This family has not been reported previously from Mexico or Central America. The occurrence of the species in Oaxaca is rather remarkable, but it is probable that it will be found also in Veracruz. The Mexican plant is the form named by Michaux *C. antillana*. That is considered a distinct species by some authors, but Urban, correctly as it seems to the present writer, treats it as a synonym of C. *racemiflora*.

82. AQUIFOLIACEAE. Holly Family.

Reference: Loesener, Monographia Aquifoliacearum, Nov. Act. Acad. Caes. Leop. Carol. **78**. 1901; **89**: 1–314. 1908.

1. ILEX L. Sp. Pl. 125, 1753.

Trees or shrubs; leaves alternate, usually serrate or crenate, thin or coriaceous, estipulate; flowers cymose or solitary in the axils, perfect or polygamous, small; petals 4 to 9, somewhat united at base, obtuse; stamens 4 to 9, adnate to base of corolla; fruit a berry-like drupe, containing 4 to 8 nutlets.

Ilex aquifolium L., of Europe, is the true holly, so frequently mentioned in literature. The American holly is *I. opaca* Ait., a native of the eastern United States, whose branches are extensively used for Christmas greens. Most species of the genus have showy red fruit, and those with evergreen leaves have very handsome foliage. The leaves of *I. vomitoria* Ait., of the southeastern United States, contain caffeine. From them the Indians of the Gulf States prepared their "black drink," which had purgative, vomitive, diuretic, and somewhat stimulant properties, and was used for ceremonial purification.

Leaves deciduous, thin ---------- **1. I condensata.**
Leaves persistent, thick.
  Inflorescences or flowers fasciculate in the leaf axils; leaves crenate or crenulate, the teeth never pointed. Flowers 4-parted.
    Leaves puberulent, 2.5 to 6 cm. long ---------- **2. I. discolor.**
    Leaves glabrous.
      Leaves 5 to 12 cm. long ---------- **3. I. tolucana.**
      Leaves 3 to 5 cm. long ---------- **4. I. socorroensis.**
  Inflorescences solitary in the leaf axils, 1 to 3-flowered or cymose; teeth of the leaves usually with spinulose tips.
    Flowers 5 to 7-parted.
      Leaves hirsutulous beneath over nearly the whole surface, the venation prominent ---------- **5. I. brandegeana.**
      Leaves glabrous beneath or puberulent along the costa, the lateral veins inconspicuous ---------- **6. I. pringlei.**
    Flowers 4-parted.
      Pistillate inflorescence usually 3-flowered ---------- **7. I. mexicana.**
      Pistillate flowers solitary.
        Leaves glabrous beneath ---------- **8. I. rubra.**
        Leaves pubescent beneath on the veins ---------- **9. I. dugesii.**

1. Ilex condensata Turcz. Bull. Soc. Nat. Moscou **32**[1]: 277. 1859.

Ilex dubia condensata Loesener in Engl. & Prantl, Pflanzenfam. Nachtr. **1**: 221. 1897.

Veracruz.

Shrub; leaves obovate or oblanceolate, 3 to 6 cm. long, petiolate, acute, serrulate, glabrous; flowers fasciculate, usually 4-parted; fruit globose, usually with 4 nutlets, 7 to 8 mm. long.

2. Ilex discolor Hemsl. Diag. Pl. Mex. 5. 1878.

Tepic to San Luis Potosí and Chiapas; type from Comitán, Chiapas.

Shrub or small tree with puberulent branchlets; leaves short-petiolate, obovate to elliptic-oblong, acute to rounded at apex, serrulate or crenate, puberulent, especially beneath, or in age glabrate; flowers greenish yellow; pedicels pubescent or glabrate.

The identification of the single Tepic specimen is doubtful.

3. Ilex tolucana Hemsl. Diag. Pl. Mex. 5. 1878.

Ilex californica T. S. Brandeg. Gard. & For. **7**: 414. 1894.

Ilex tolucana bourgaeavi Loesener, Nov. Act. Acad. Caes. Leop. Carol. **78**: 302. 1901.

Ilex tolucana liebmannii Loesener, Nov. Act. Acad. Caes. Leop. Carol. **78**: 302. 1901.

Ilex tolucana californica Loesener, Nov. Act. Acad. Caes. Leop. Carol. **78**: 302. 1901.

Veracruz, Mexico, Hidalgo, and Oaxaca; Baja California; type from Toluca, Hidalgo.

Glabrous shrub; leaves lanceolate or oblanceolate to oval, acute at base, obtuse at apex, serrulate or crenulate, lustrous; inflorescence glabrous; fruit globose, 4 to 6 mm. in diameter, with 4 nutlets, these 3-striate on the back. "Limoncillo" (Hidalgo).

The varieties described by Loesener differ only in leaf form. The writer has not seen sufficient material of the species to be able to judge of their systematic value.

This species is closely related to *I. paraguariensis* St. Hil., the Paraguay tea or mate of Argentina, Paraguay, and Brazil, whose leaves are widely used in South America for the preparation of a beverage, which largely replaces tea and coffee in those regions.

Ilex nitida (Vahl) Maxim. is reported from Veracruz by Loesener, but the writer has seen no specimens. It is closely related to *I. tolucana*, and the specimens reported may belong rather to the latter species.

4. **Ilex socorroensis** T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 90. 1910.

Known only from Socorro Island, the type locality.

Leaves obovate, 2 to 3 cm. wide, rounded at apex, crenate-dentate, lustrous above; nutlets 4 or 5.

No material has been seen by the writer.

5. **Ilex brandegeana** Loesener, Nov. Act. Acad. Caes. Leop. Carol. **78**: 148. 1901.

Ilex triflora T. S. Brandeg. Gard. & For. **7**: 347. 1894. Not *I. triflora* Blume, 1826.

Baja California, Sinaloa, and Durango; type locality, La Chuparosa, Baja California.

Tree, 4.5 meters high, with hirsutulous branchlets; leaves elliptic or ovate-lanceolate, 3 to 8.5 cm. long, acute, appresssed-serrulate, hirsutulous on the upper surface or glabrate; flowers 5 or 6-parted, sweet-scented; fruit 7 to 9 mm. in diameter. "Junco serrano" (Sinaloa).

6. **Ilex pringlei** Standl. sp. nov.

Hidalgo; type from Trinidad (*Pringle* 10003; U. S. Nat. Herb. No. 462069).

Branchlets puberulent or glabrate; leaves ovate or elliptic, 4 to 6.5 cm. long, rounded to acute at base, acuminate or abruptly acute at apex, lustrous, with a few appressed spinulose teeth or subentire; pistillate pedicels 5 to 9 mm. long; flowers 6 or 7-parted; fruit globose, 6 mm. in diameter; nutlets 6, strongly compressed, smooth.

Some of the inflorescences are fasciculate, but the upper ones are solitary. Pringle's 10004 from Trinidad is apparently of the same species. In it the pistillate pedicels are all solitary.

7. **Ilex mexicana** (Turcz.) Black; Hemsl. Biol. Centr. Amer. Bot. **1**: 187. 1880.

Pileostegia mexicana Turcz. Bull. Soc. Nat. Moscou **32**[1]: 277. 1859.

Ilex cassine mexicana Loesener, Nov. Act. Acad. Caes. Leop. Carol. **78**: 147. 1901.

Veracruz.

Small tree, nearly glabrous throughout; leaves lance-elliptic or oblong-elliptic, 6.5 to 9 cm. long, short-petiolate, acute or obtuse at base, abruptly short-acuminate at apex, conspicuously spinulose-serrate; fruit red, globose, 5 to 6 mm. in diameter, with 4 nutlets.

8. **Ilex rubra** S. Wats. Proc. Amer. Acad. **21**: 422. 1886.

Mountains of Chihuahua; type from Norogachi.

Tree, 4 to 7 meters high, glabrous or nearly so; leaves oval, obovate, or oblong-lanceolate, 4.5 to 6 cm. long, acute, serrate, minutely puberulent above along the costa; fruit globose, red, 7 to 8 mm. in diameter; nutlets 4.

9. **Ilex dugesii** Fernald, Bot. Gaz. **20**: 533. 1895.

Known only from the type locality, Sierra de Santa Rosa, near Guanajuato.

Leaves oblong, obovate-oblong, or oval-oblong, 3.5 to 6 cm. long, acute or obtuse at base, short-acuminate at apex, serrulate; fruit globose, 7 to 8 mm. in diameter, red; nutlets 4. "Naranjillo."

83. CELASTRACEAE. Bittersweet Family.

Shrubs or trees, sometimes scandent; leaves opposite or alternate, entire or toothed; stipules minute and caducous or wanting; flowers small, perfect, usually cymose; calyx 4 or 5-lobed; petals 4 or 5, small, spreading, sessile below the margin of the disk, imbricate; stamens 4 or 5, the anthers 2-celled; ovary 2 to 5-celled; fruit capsular, baccate, drupaceous, or samaroid.

Fruit a samara.
- Fruit longitudinally 3-winged; leaves alternate ---------- 1. **WIMMERIA.**
- Fruit with a single terminal wing; leaves opposite ---------- 2. **ZINOWIEWIA.**

Fruit a capsule, berry, or drupe.
- Fruit a capsule.
  - Leaves opposite.
    - Capsule 1-celled ---------- 3. **MICROTROPIS.**
    - Capsule 2 to 5-celled.
      - Capsule 3 to 5-celled ---------- 4. **EUONYMUS.**
      - Capsule 2-celled ---------- 5. **PACHYSTIMA.**
  - Leaves alternate.
    - Ovary free from the disk; ovules 2 in each cell ---------- 6. **CELASTRUS.**
    - Ovary confluent with the disk; ovule 1 in each cell ---------- 7. **MAYTENUS.**

Fruit a berry, drupe, or indehiscent capsule.
- Leaves all or most of them opposite.
  - Flowers dioecious; sepals distinct or nearly so ---------- 8. **GYMINDA.**
  - Flowers perfect; sepals united below ---------- 9. **RHACOMA.**
- Leaves all alternate.
  - Stamens 10; petals ligulate or oblanceolate ---------- 10. **FORSELLESIA.**
  - Stamens 4 or 5; petals broad.
    - Flowers 4-parted ---------- 11. **SCHAEFFERIA.**
    - Flowers 5-parted.
      - Fruit dry.
        - Fruit 1-seeded; leaves entire ---------- 12. **MORTONIA.**
        - Fruit 2-seeded; leaves glandular-serrate ---------- 13. **ORTHOSPHENIA.**
      - Fruit drupaceous or baccate.
        - Fruit 1-celled, 1-seeded; branches spinose, the leaves caducous. **14. ACANTHOTHAMNUS.**
        - Fruit 2 or 3-celled, 2 to 6-seeded; branches not spinose, the leaves persistent.
          - Flowers paniculate; ovary free from the disk. **15. PERROTTETIA.**
          - Flowers cymose; ovary confluent with the disk. **16. ELAEODENDRON.**

1. WIMMERIA Schlecht. & Cham. Linnaea 6: 427. 1831.

Shrubs or trees; leaves alternate, serrate or crenate, estipulate; flowers small, in axillary cymes; calyx 5-lobed; petals 5; stamens 5; ovary 3-celled, with 6 to 8 ovules in each cell; fruit samaroid, 1-celled, 1 or 2-seeded, with 3 broad longitudinal wings.

Fruit evidently longer than broad, usually 2 to 3 cm. long------1. W. concolor.
Fruit as broad as long or broader, rarely as much as 1.5 cm. long.
  Petioles and leaf blades glabrous.
    Leaves obtuse----------2. W. pallida.
    Leaves acuminate or long-acuminate.
      Leaves ovate; fruit shallowly notched at apex-------3. W. persicifolia.
      Leaves lanceolate; fruit deeply notched at apex-------4. W. lanceolata.
  Petioles, and usually the lower surface of leaves, pubescent.
    Leaf blades glabrous----------5. W. confusa.
    Leaf blades pubescent on one or both surfaces.
      Fruit as long as broad; leaves sparsely puberulent beneath, glabrate above ----------6. W. pubescens.
      Fruit broader than long; leaves densely puberulent on both surfaces. 7. W. microphylla.

1. **Wimmeria concolor** Schlecht. & Cham. Linnaea 6: 428. 1831.
Wimmeria discolor Schlecht. & Cham. Linnaea 6: 428. 1831.

Tamaulipas, San Luis Potosí, and Veracruz; type from Colipa, Veracruz.

Shrub or tree, 1 to 12 meters high, the trunk sometimes 30 cm. in diameter; leaves ovate or lance-ovate, 4 to 6 cm. long, acute or acuminate, crenate-serrate or nearly entire, lustrous on the upper surface; petals 3 mm. long; fruit 1.5 to 2.5 cm. wide, often tinged with red. "Pimientilla" (Tamaulipas); "palo cadillo" (San Luis Potosí).

Palmer states that the wood is light-colored, and that it is used for railroad ties.

2. **Wimmeria pallida** Radlk. Sitzungsb. Math. Phys. Akad. Wiss. München 8: 379. 1878.

Guerrero; type probably from Acapulco.

Spreading glabrous shrub, 2.5 meters high; leaves ovate or lance-ovate, 5 to 8.5 cm. long, slender-petiolate, crenulate; fruit 1.5 to 2 cm. broad.

3. **Wimmeria persicifolia** Radlk. Sitzungsb. Math. Phys. Akad. Wiss. München 8: 379. 1878.

Guerrero, Morelos, and Oaxaca; type from Ejutla, Oaxaca.

Glabrous shrub or tree, 3 to 6 meters high; leaves slender-petiolate, 4 to 8.5 cm. long, finely crenate-serrate, long-acuminate; petals 4 to 5 mm. long; fruit 1.5 to 2 cm. wide. "Chapulizle" (Oaxaca, *Reko*).

4. **Wimmeria lanceolata** Rose, Contr. U. S. Nat. Herb. 12: 283. 1909.

Guerrero; type from Iguala.

Shrub, 3 to 5 meters high, glabrous throughout; leaves slender-petiolate, 5 to 11 cm. long, crenate-serrulate; petals cream-colored, 3 to 4 mm. long; fruit 1 to 2 cm. broad.

5. **Wimmeria confusa** Hemsl. Diag. Pl. Mex. 6. 1878.

Chihuahua, Sonora, Durango, Sinaloa, Jalisco, and Aguascalientes (type locality).

Shrub or tree, 2 to 8 meters high; leaves short-petiolate, lanceolate, oblanceolate, or obovate, 1 to 4 cm. long, obtuse or rounded at apex, crenulate or

subentire, pale green; petals 3 mm. long; fruit 1 to 1.5 cm. broad. "Algodoncillo," "cedilla," "acedilla" (Sinaloa).

The wood is used for various purposes and is reported to be durable if not exposed to too abundant moisture. The name "algdoncillo" is said to refer to the white fiber of the bark.

6. **Wimmeria pubescens** Radlk. Situngsb. Math. Phys. Akad. Wiss. München **8**: 378. 1878.

Veracruz; type from Consoquitla.

Large shrub or small tree; leaves obovate, 1 to 3 cm. long, short-petiolate or subsessile, rounded at apex, crenulate or subentire; petals 2.5 mm. long; fruit 1 to 1.5 cm. broad, tinged with purple.

7. **Wimmeria microphylla** Radlk. Bot. Centralbl. **15**: 359. 1903.

Puebla.

Shrub, 1.5 to 3 meters high; leaves obovate or broadly obovate, 0.5 to 1.5 cm. long, sessile or short-petiolate, rounded at apex, entire or crenulate; petals 2.5 mm. long; fruit 1.5 cm. broad or less.

2. ZINOWIEWIA Turcz. Bull. Soc. Nat. Moscou 32[1]: 275. 1859.

The genus consists of a single species.

1. **Zinowiewia integerrima** Turcz. Bull. Soc. Nat. Moscou **32**[1]: 275. 1859.

Morelos and Veracruz. Costa Rica.

Small tree, glabrous throughout; leaves opposite, petiolate, elliptic, ovate, or ovate-elliptic, 4.5 to 10 cm. long, acute or acuminate, entire; flowers very small, numerous, in axillary cymes; petals 5; stamens 5; fruit a samara, 1-seeded, about 2 cm. long, the wing apical, decurrent, obtuse; wood white. "Palo blanco" (Veracruz).

3. MICROTROPIS Wall. Numer. List 152. 1829.

Glabrous shrubs or trees; leaves opposite, petiolate, persistent, estipulate, entire; flowers in axillary cymes or fascicles, 5-parted; stamens 5; ovary 2 or 3-celled; capsule coriaceous, 1-celled, bivalvate, 1-seeded.

Cymes 4 to 7-flowered ..... 1. **M. occidentalis.**
Cymes 8 to 30-flowered ..... 2. **M. schiedeana.**

1. **Microtropis occidentalis** Loesener, Bot. Gaz. **24**: 393. 1897.

Veracruz. Central America.

Leaves oblong or oval-oblong, 6 to 13 cm. long, 2 to 5 cm. wide, obtusely acuminate, cuneate at base, with about 6 pairs of lateral nerves; flowers 3 mm. broad, the petals whitish; fruit oblong, 12 to 13 mm. long.

2. **Microtropis schiedeana** Loesener, Bot. Jahrb. Engler **29**: 98. 1900.

Type from Chiconquiaco, Veracruz.

Leaves oblong or oval-oblong, 6 to 13 cm. long, 2 to 5 cm. wide, obtuse or obtusely short-acuminate, acute at base, the lateral nerves 7 to 9 pairs.

4. EUONYMUS L. Sp. Pl. 197. 1753.

Trees or shrubs; leaves opposite, petiolate, persistent, entire or serrate; flowers perfect, in axillary cymes; calyx 4 or 5-lobed; petals 4 or 5, spreading; stamens 4 or 5; fruit a capsule, 3 to 5-celled, the cells 1 or 2-seeded; seeds each covered with an aril.

The writer has seen no material of either of the following species. Bentham's original descriptions afford no distinguishing characters, and consequently only translations of the original descriptions are reproduced here.

1. Euonymus mexicanus Benth. Pl. Hartw. 36. 1840.

Type from mountains near Huasca, Hidalgo.

"Branches smooth, 4-costate; leaves short-petiolate, lanceolate, shallowly crenulate, thickish (persistent ?); peduncles 1 to 3-flowered; petals orbicular. —Shrub 2.4 to 3 meters high; leaves usually complicate, recurved, the margin undulate. Similar to *E. americanus*, but the crenations of the leaves more obtuse, the flowers smaller and usually 4-parted."

2. Euonymus acuminatus Benth. Pl. Hartw. 59. 1840.

Type from Llano Verde, Oaxaca.

"Branches smooth; leaves ovate-lanceolate or oblong, obtusely acuminate, lightly crenate; peduncles 3 to 5-flowered; petals suborbicular; capsule verrucose (?). —Shrub 1.8 to 3 meters high, related to *E. americanus*, but the leaves broader at base and more conspicuously acuminate at apex, the peduncles longer, and the flowers much larger and more numerous."

5. PACHYSTIMA Raf. Amer. Month. Mag. 2: 176. 1818.

Only one other species is known, a native of the mountains of Virginia and West Virginia.

1. Pachystima myrsinites (Pursh) Raf. Fl. Tellur. 42. 1838.

Ilex myrsinites Pursh, Fl. Amer. Sept. 119. 1814.

A single Mexican specimen seen, from the Sierra Madre south of Saltillo, Coahuila. The species ranges through the Rocky Mountains and westward to California and British Columbia.

Low shrub, sometimes prostrate; leaves opposite, persistent, oval to oblong or elliptic, 1 to 3 cm. long, dentate, glabrous, short-petiolate; flowers solitary or clustered in the leaf axils, green, minute; sepals 4; petals 4; fruit a capsule.

The Mexican specimens are noteworthy for their small leaves, and may represent a distinct species. They come from a locality far distant from any other station known for the species.

6. CELASTRUS L. Sp. Pl. 196. 1753.

Shrubs or small trees, usually scandent; leaves alternate, deciduous, short-petiolate; flowers small, usually 5-parted; stamens 5; capsule 3 or 4-celled, loculicidally dehiscent; seeds 2 in each cell, inclosed in an aril.

Leaves serrulate; capsule 3-celled ..... **1. C. pringlei.**
Leaves entire; capsule 4-celled ..... **2. C. tetramerus.**

1. Celastrus pringlei Rose, Contr. U. S. Nat. Herb. 5: 195. 1899.

Morelos; type from Cuernavaca.

Scandent shrub, 6 meters long, glabrous throughout; leaves short-petiolate, narrowly lance-oblong, 7 to 10 cm. long, acute; flowers in axillary racemes 2.5 to 5 cm. long; sepals 5; petals 5, white; capsule terete, obovoid, 12 mm. long; seeds each covered with a yellow aril.

2. Celastrus tetramerus Standl., sp. nov.

Vicinity of Iguala, Guerrero (type, *Pringle* 10319; U. S. Nat. Herb. no. 462573).

Small tree, glabrous; petioles about 5 mm. long; leaf blades lance-oblong, 8 to 11 cm. long, 2.5 to 3.5 cm. wide, acuminate, acute at base, thin, entire, paler beneath; flowers axillary, fasciculate or in short racemes, the pedicels in fruit about 1 cm. long; calyx 4-lobate, the lobes obtuse; fruit globose or depressed-globose, 8 mm. broad, 4-celled; stigma 4-lobate.

DOUBTFUL SPECIES.

CELASTRUS MEXICANUS DC. Prodr. 2: 8. 1825. Described from Mexico, the description based upon one of Sessé and Mociño's drawings.

7. MAYTENUS Molina, Sagg. Stor. Nat. Chil. 177. 1782.

Trees or shrubs; leaves alternate, persistent, entire or toothed; stipules minute, deciduous; flowers polygamous, paniculate or solitary, axillary; calyx 5-parted; petals 5, spreading; stamens 5; capsule coriaceous, 1 to 3-celled; seed covered with a fleshy aril.

Leaves pale green, very thick and fleshy, usually entire; flowers fasciculate. **1. M. phyllanthoides.**

Leaves bright green, not fleshy, crenate or serrate; flowers cymose or paniculate.

Leaves oblong-lanceolate, acute at base ..... **2. M. repandus.**

Leaves oblong-elliptic to elliptic-oval, rounded or very obtuse at base. **3. M. trichotomus.**

1. **Maytenus phyllanthoides** Benth. Bot. Voy. Sulph. 54. 1844.

Tricerma crassifolium Liebm. Nat. For. Kjöbenhavn Vid. Medd. **1853**: 98. 1854.

Baja California and Sonora to Yucatán and Puebla; type from Magdalena Bay, Baja California. Southern Florida; Cuba.

Shrub or small tree, 1 to 7.5 meters high, glabrous; leaves mostly obovate or broadly obovate, 2 to 4 cm. long, acute or obtuse at base, rounded at apex, the venation obscure; flowers pedicellate; petals 1.5 mm. long; fruit obovoid, 7 to 9 mm. long; seeds 1 or 2, covered with a red aril. "Mangle dulce" (Baja California); "mangle" (Sonora); "aguabola," "mangle aguabola" (Sinaloa, Puebla, *Seler*).

The plant usually, but not always, grows along sea beaches, in places that are submerged at high tide. The wood is used for fuel. Seler states that the leaves are employed as a remedy for scurvy and toothache.

2. **Maytenus repandus** Turcz. Bull. Soc. Nat. Moscou **31**[1]: 450. 1858.

Oaxaca, Chiapas, and perhaps Veracruz; type from Tolutla, Chiapas.

Glabrous; leaves petiolate, 3 to 7 cm. long, acuminate, crenate-serrate; inflorescence few or many-flowered.

3. **Maytenus trichotomus** Turcz. Bull. Soc. Nat. Moscou **31**[1]: 451. 1858.

Veracruz, Oaxaca, and Chiapas; type from Jitatole, Chiapas.

Shrub (scandent); leaves short-petiolate, 5.5 to 10 cm. long, abruptly acuminate, glabrous, crenate-serrate or nearly entire; panicles half as long as the leaves or shorter; fruit subglobose, 1 cm. long.

8. GYMINDA Sarg. Gard. & For. 4: 4. 1891.

1. **Gyminda latifolia** (Swartz) Urban, Symb. Antill. **5**: 80. 1904.

Myginda latifolia Swartz, Prodr. Veg. Ind. Occ. 39. 1788.

Tamaulipas and Veracruz. Florida; West Indies.

Glabrous tree, sometimes 9 meters high, with a trunk 20 cm. in diameter; bark thin, reddish brown; leaves opposite, persistent, short-petiolate, usually obovate or broadly obovate, 2 to 6 cm. long, obtuse or rounded at apex, entire or crenulate; flowers greenish, dioecious, in axillary cymes; calyx 4-parted; petals 4, 1.5 to 2 cm. long; fruit a black drupe, 5 to 8 mm. long; wood dense, very dark brown, its specific gravity about 0.90. "Mala mujer," "cocorroncito" (Porto Rico).

The English name is "false boxwood."

9. RHACOMA L. Syst. Nat. ed. 10. 896. 1759.

Trees or shrubs; leaves opposite, or some of them alternate, entire or toothed; stipules small; flowers minute, cymose, axillary; calyx usually

4-lobate; petals usually 4, reflexed or spreading; stamens 4; ovary 2 to 4-celled; fruit drupaceous, 1-celled.

Inflorescences nearly sessile; leaves all linear or lance-linear, less than 3 mm. wide ..... 1. R. managuatillo.

Inflorescences long-pedunculate; leaves lanceolate or broader, most of them more than 1 cm. wide.

Branchlets sharply angled.

Leaves densely pubescent, obtuse or rounded at apex; calyx pubescent. 2. R. uragoga.

Leaves glabrous, acuminate; calyx glabrous ..... 3. R. scoparia.

Branchlets terete or nearly so.

Leaves glabrous beneath; fruit 10 to 12 mm. long ..... 4. R. oxyphylla.

Leaves puberulent beneath along the veins; fruit about 15 mm. long. 5. R. macrocarpa.

1. **Rhacoma managuatillo** Loesener, Repert. Sp. Nov. Fedde 8: 294. 1910.

Michoacán; type from Panda.

Shrub; branchlets slender, sharply quadrangular, glabrous or when young short-pilose; leaves 4 to 17 mm. long, entire or obscurely crenulate, sessile, glabrous; inflorescence few-flowered, short-pilose, the flowers green; fruit red, 8 to 10 mm. long, long-pedicellate. "Managuatillo."

2. **Rhacoma uragoga** (Jacq.) Baill. Hist. Pl. 8: 27. 1877.

Myginda uragoga Jacq. Enum. Pl. Carib. 12. 1760.

Myginda coccinea Turcz. Bull. Soc. Nat. Moscou 36[1]: 604. 1863.

Veracruz and Oaxaca. Cuba; Colombia.

Slender shrub, the branchlets densely short-pilose; leaves short-petiolate, ovate to rounded-ovate, 1.5 to 5 cm. long, irregularly serrate or subentire; inflorescence short, few or many-flowered, the flowers dark red; petals 1.5 mm. long; fruit red, 5 to 7 mm. long. "Hierba maravedí" (Cuba).

3. **Rhacoma scoparia** (Hook. & Arn.) Standl.

Myginda scoparia Hook. & Arn. Bot. Beechey Voy. 283. 1841.

Known only from the vicinity of Acapulco, the type locality.

Slender shrub, glabrous throughout; leaves short-petiolate, lanceolate or ovate, 2 to 4 cm. long, those of the flowering branches often much reduced, serrulate; inflorescence few-flowered; flowers deep red; fruit red, about 6 mm. long.

4. **Rhacoma oxyphylla** (Blake) Standl.

Myginda oxyphylla Blake, Contr. Gray Herb. n. ser. 53: 60. 1918.

Oaxaca; type from Cafetal Nueva Esperanza, Pochutla, altitude 800 meters.

Leaves short-petiolate, lanceolate or elliptic-lanceolate, 4 to 7.5 cm. long, 1.2 to 2.5 cm. wide, acuminate, crenate-serrulate; panicles 7.5 cm. long or shorter, slender-pedunculate; petals purplish, 1.5 mm. long.

5. **Rhacoma macrocarpa** (T. S. Brandeg.) Standl.

Myginda macrocarpa T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 56. 1914.

Known only from the type locality, Finca Mexiquito, Chiapas.

Shrub; leaves oblong-ovate or elliptic, 9 cm. long and 4 cm. wide or smaller, acuminate, obscurely crenate-serrulate, short-petiolate.

10. FORSELLESIA Greene, Erythea 1: 206. 1893.

1. **Forsellesia spinescens** (A. Gray) Greene, Erythea 1: 206. 1893.

Glossopetalon spinescens A. Gray, Pl. Wright. 2: 29. *pl. 12. f. B.* 1853.

Northern Chihuahua. Oklahoma and western Texas to southern California; type from Frontera, Texas.

Densely branched shrub, a meter high or less, the branches angulate, usually glabrous; leaves alternate, short-petiolate, 4 to 8 mm. long, oblanceolate, acute, glaucous, entire, soon deciduous; flowers subsolitary, axillary, short-pedicellate; petals 5, white, oblanceolate or ligulate, 3 to 4 mm. long; stamens 10; fruit coriaceous, ovoid, asymmetric, acute, about 5 mm. long.

11. SCHAEFFERIA Jacq. Enum. Pl. Carib. 10. 1760.

Shrubs or trees, glabrous; leaves alternate or fasciculate, entire, coriaceous, estipulate; flowers sessile or pedicellate in the axils, dioecious; calyx 4-parted; petals 4; fruit a dry or nearly dry drupe, 2-celled.

Leaves densely pilose ---------- 1. S. pilosa.
Leaves glabrous.
  Leaves mostly 1.5 to 2.5 cm. wide, not fasciculate ---------- 2. S. frutescens.
  Leaves 2 to 8 mm. wide, chiefly fasciculate.
    Leaves obovate-spatulate, pinnate-nerved ---------- 3. S. cuneifolia.
    Leaves linear-spatulate, the nerves parallel, extending from base to apex of the blade ---------- 4. S. stenophylla.

1. Schaefferia pilosa Standl., sp. nov.

Type collected near Huajuapam, Oaxaca, altitude 1,680 to 1,950 meters (*Nelson* 1965; U. S. Nat. Herb. no. 569292).

Branches grayish, puberulent when young; leaves mostly fasciculate on short lateral spurs, rounded-spatulate or ovate-spatulate, 1.5 to 2.5 cm. long, obtuse or rounded at apex, cuneate at base and decurrent into a short petiole, thin, yellowish green, rather densely short-pilose on both surfaces, pinnately nerved; flowers axillary, the pedicels stout, 2 to 3 mm. long, glabrous; calyx lobes about 0.5 mm. long, obtuse, glabrous; fruit fleshy, 4 to 5 mm. long, pubescent.

2. Schaefferia frutescens Jacq. Enum. Pl. Carib. 33. 1760.

? *Schaefferia viridescens* DC. Prodr. 2: 41. 1825.

Reported from Veracruz. Florida, West Indies, and Colombia.

Shrub or tree, sometimes 12 meters high, with a trunk 30 cm. in diameter; bark thin, light gray, slightly grooved; leaves short-petiolate, lanceolate, elliptic, or oval, acute or acuminate; flowers pedicellate; petals 3.5 to 4 mm. long; fruit 4 to 6 mm. long, bright red, with unpleasant taste; wood yellow, dense, the specific gravity about 0.77. "Cabra" (Santo Domingo).

Known as "Florida boxwood" or "yellow-wood."

3. Schaefferia cuneifolia A. Gray, Pl. Wright. 1: 35. 1852.

Coahuila. Western Texas; type from "high prairies of the San Felipe, and on the San Pedro."

Shrub, about 1 meter high, densely branched, the branchlets often spinose; leaves cuneate-obovate, sessile, rounded, or notched at apex; flowers sessile, greenish; fruit red, 4 mm. long. "Capul" (Texas).

The roots are said to be used as a remedy for venereal diseases.

4. Schaefferia stenophylla Standl., sp. nov.

Vicinity of Tehuacán, Puebla (type, *Pringle* 7503; U. S. Nat. Herb. no. 316732).

Shrub, about 1 meter high, glabrous; leaves fasciculate on short stout lateral spurs, linear-spatulate, 7 to 20 mm. long, 2 to 4 mm. wide, obtuse to truncate at apex, mucronulate, gradually attenuate to base, sessile, bright green, subcoriaceous, parallel-nerved; pedicels short and stout, glabrous; fruit 3.5 to 5 mm. long and often as broad, rarely 1-celled.

12. MORTONIA. A. Gray, Pl. Wright. 1: 35. 1852.

REFERENCE: Trelease in A. Gray, Syn. Fl. 1^1: 400. 1897.

Low shrubs; leaves alternate, persistent, entire, 1-nerved, usually very thick, the margins often revolute; flowers small, white, cymose, the cymes borne in the upper axils and forming a terminal panicle; calyx tube 10-angled, 5-lobed; petals 5, erose-dentate; stamens 5; ovary imperfectly 5-celled; fruit dry, indehiscent, 1-celled, 1-seeded.

Leaves suborbicular or oval ---------- 1. M. scabrella.
Leaves spatulate to linear-oblanceolate.
  Leaves linear-oblanceolate, scarcely broadened toward the apex. 2. M. palmeri.
  Leaves spatulate or oblanceolate, much broader toward the apex.
    Leaves thin, glabrous, the margins thin, not revolute ---------- 3. M. greggii.
    Leaves very thick, the margins strongly thickened, revolute.
      Leaves glabrous ---------- 4. M. diffusa.
      Leaves scaberulous on the upper surface ---------- 5. M. hidalgensis.

1. **Mortonia scabrella** A. Gray, Pl. Wright. 2: 28. 1853.

Chihuahua and northern Sonora; type from San Pedro, Sonora. Southern Arizona to western Texas.

Shrub, 1.5 to 2.5 meters high, densely branched; leaves short-petiolate, 5 to 9 mm. long, rounded at apex, scaberulous on the upper surface, very thick, with revolute margins; calyx hirtellous; petals 2 mm. long; fruit 4 to 5 mm. long.

2. **Mortonia palmeri** Hemsl. Diag. Pl. Mex. 24. 1879.

Coahuila, San Luis Potosí, and Zacatecas; type from the region of San Luis Potosí.

Branches puberulent; leaves 1 to 2 cm. long, obtuse or acute, glabrous, very thick, the margins strongly revolute; calyx glabrous; petals suborbicular, 2 mm. long; fruit 4 to 5 mm. long. "Afinador" (Zacatecas).

3. **Mortonia greggii** A. Gray, Pl. Wright, 1: 35. 1852.

Mortonia effusa Turcz. Bull. Soc. Nat. Moscou 31^1: 453.

Coahuila and Nuevo León; type from Rinconada.

Branches puberulent; leaves 1.5 to 2.5 cm. long, acute or obtuse, mucronate, bright green; calyx glabrous; petals 2 mm. long; fruit 4 to 5 mm. long. "Afinador" (Coahuila).

4. **Mortonia diffusa** Rose & Standl., sp. nov.

Puebla; type from Tehuacán (*Pringle* 8569; U. S. Nat. Herb. No. 461507).

Shrub, 1 to 1.15 meters high, the branches brown, hirtellous; leaves short-petiolate, 1 to 1.5 cm. long, obtuse or rounded at apex, mucronate, bright green; inflorescence comparatively large and lax; calyx glabrous; petals suborbicular, 2 mm. long.

Collected also at San Luis Tultilanapa by Purpus (no. 2700).

5. **Mortonia hidalgensis** Standl., sp. nov.

Hidalgo; type from Zimapán (*Ehrenberg* 1038; U. S. Nat. Herb. no. 617127).

Branches densely hirtellous; leaves short-petiolate, 1 to 1.5 cm. long, oblanceolate or obovate, rounded at apex, mucronate, bright green, glabrous beneath; inflorescence small and dense; calyx hirtellous; petals orbicular, 2 mm. long; fruit 4 mm. long.

Collected also at Ixmiquilpan by Rose, Painter, and Rose (no. 9047).

13. **ORTHOSPHENIA** Standl., gen. nov.

Erect shrub; leaves alternate, coriaceous, glandular-serrate, short-petiolate; stipules minute, subulate, persistent; flowers minute, solitary or fasciculate in the leaf axils, nearly sessile; calyx deeply 5-lobate, the lobes obtuse, thickened, persistent; petals 5; stamens 5; stigma nearly sessile, shallowly bilobate; fruit apparently dry and indehiscent, thin-walled, 1-celled; seeds 2, basilar, erect, without endosperm.

1. **Orthosphenia mexicana** Standl., sp. nov.

Type collected between Miquihuana and Doctor Arroyo, along the boundary between Tamaulipas and Nuevo León (*Nelson* 4509; U. S. Nat. Herb. no. 332538).

Branches terete, grayish, glabrous or nearly so; leaves approximate, erect and subappressed, subimbricate, cuneate-obovate, 5 to 8 mm. long, rounded at apex, cuneate at base, on a very short thick petiole, very thick, glabrous or nearly so, coarsely glandular-serrate, the venation nearly obsolete; flowers 1 to 3 in each axil, about 1.5 mm. long in bud, glabrous; fruit oval-globose, 3 mm. long, green, smooth and glabrous; seeds semiglobose, blackish, 2.5 mm. long.

The type specimen consists of a fruiting branch. The writer has seen one other specimen of the plant, collected by Berlandier and labeled "Matamoros?" It consists of a single branch bearing flower buds. Each tooth of the leaves ends in a pore from which there is a copious exudate of wax. When the leaves are boiled in water the wax melts and rises to the surface.

14. **ACANTHOTHAMNUS** T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 383. 1909.

1. **Acanthothamnus aphyllus** (Schlecht.) Standl.

Celastrus aphyllus Schlecht. Linnaea 15: 458. 1841.

Acanthothamnus viridis T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 383. 1909.

Scandivepres mexicanus Loesener, Repert. Sp. Nov. Fedde 8: 292. 1910.

Puebla and perhaps elsewhere; type from Jacualtepán.

Densely branched glabrous shrub, 1 meter high, with green alternate branches; leaves alternate, caducous, narrowly spatulate, 5 mm. long; stipules glandlike; flowers axillary, pedicellate; calyx 5-lobate; petals 5, suborbicular, 2 to 3 mm. long; stamens 5; ovary 2-celled; fruit ovoid, red, 5 mm. long, the exocarp thin, fleshy, 1-celled; seed 1.

In general appearance the plant suggests *Koeberlinia*. There is little doubt that the names given by Schlechtendal and Brandegee apply to the same plant.

15. **PERROTTETIA** H. B. K. Nov. Gen. & Sp. 7: 73. 1825.

Shrubs or trees; leaves alternate, short-petiolate; flowers minute, polygamo-dioecious, in axillary panicles; calyx 5-lobate; petals 5, valvate or obscurely imbricate; stamens 5; ovary 2-celled; fruit baccate, 2-celled, 2 to 4-seeded.

Leaves broadly rounded at base; panicle branches glabrous_____1. **P. ovata.**
Leaves obtuse or broadly cuneate at base; panicle branches minutely puberulent. **2. P. longistylis.**

1. **Perrottetia ovata** Hemsl. Diag. Pl. Mex. 6. 1878.

Perrottetia glabrata Rose, Contr. U. S. Nat. Herb. 5: 110. 1897.

Veracruz; type from Jalapa.

Tree, 4.5 to 6 meters high, glabrous throughout or nearly so; leaves broadly ovate, 7 to 13 cm. long, 4 to 6 cm. wide, long-acuminate, serrulate; panicles lax and open, long-pedunculate, equaling or shorter than the leaves.

2. **Perrottetia longistylis** Rose, Contr. U. S. Nat. Herb. 5: 110. 1897.

Veracruz, Oaxaca, and Chiapas; type from Izhuatlancillo, near Orizaba, Veracruz. Guatemala.

Leaves oblong or oblong-ovate, 7 to 20 cm. long, 3 to 8 cm. wide, acuminate, serrulate, finely puberulent beneath or glabrate; panicles equaling or shorter than the leaves.

Reported by Hemsley as *P. quindiuensis* H. B. K.

16. ELAEODENDRON Jacq. Nov. Act. Helv. Phys. Math. 1: 36. 1787.

1. **Elaeodendron xylocarpum** (Vent.) DC. Prodr. 2: 11. 1825.

Cassine xylocarpa Vent. Choix Pl. Cels 23. *pl. 23.* 1803.

Elaeodendron xylocarpum continentale Harms & Loes. Bot. Jahrb. Engler 29: 98. 1900.

Veracruz; Tres Marías Islands (?). West Indies; Mujeres Island.

Shrub or tree, sometimes 10 meters high, glabrous throughout; leaves short-petiolate, obovate to elliptic-oblong or rounded, 4 to 13 cm. long, acute or obtuse, acute to rounded at base, coriaceous, obscurely serrulate or crenulate, often pale; petals white, about 3 mm. long; fruit globose or obovate, 1 to 3 cm. long, yellow or orange. "Guayarrote," "coscorrón," "cocorrón" (Porto Rico); "piñipiñi," "pinipiniche" (Cuba).

The vernacular name of the Tres Marías Islands plant is given as "mano de león."

84. HIPPOCRATEACEAE. Hippocratea Family.

1. HIPPOCRATEA L. Sp. Pl. 1191. 1753.

REFERENCE: Miers, On the Hippocrateaceae of South America, Trans. Linn. Soc. Bot. 28: 319–432. *pl. 16–32.* 1872.

Trees or shrubs, often scandent; leaves opposite, persistent, petiolate, entire or toothed; stipules small, caducous; flowers small, greenish, in axillary cymes or panicles; calyx 5-parted; petals usually 5, spreading, valvate or imbricate; stamens 3; fruit a large capsule, strongly compressed vertically, 3-lobed or of 3-carpels, the carpels coriaceous, bivalvate along the middle; seeds 2 to 6 in each cell, large, compressed, broadly winged.

Hippocratea volubilis L. (*H. ovata* Lam.; *H. scandens* Jacq.) has been reported from Mexico, but no specimens have been seen by the writer. It is a West Indian species, with edible seeds. The seeds yield an odorless colorless oil. The plant is reputed to have pectoral properties, and it is one of the West Indian remedies for snake bites.

Branches of the inflorescence glabrous or very sparsely and obscurely puberulent, slender; inflorescence long, much branched, many-flowered; branchlets glabrous.

Leaves mostly elliptic or oblong-elliptic, 3 to 7 cm. wide, broadest about the middle, usually acute or short-acuminate; cymes much shorter than the leaves ---------- **1. H. celastroides.**

Leaves obovate-oblong or oblanceolate-oblong, 1 to 3.5 cm. wide, broadest toward the apex, usually rounded or obtuse at apex; cymes often longer than the leaves ---------- **2. H. acapulcensis.**

Branches of the inflorescence densely puberulent or tomentulose, stout inflorescence short and comparatively few-flowered; branchlets often densely puberulent.

Leaves scaberulous on the upper surface, pubescent beneath, at least when young ---------- **3. H. uniflora.**

Leaves smooth, glabrous.
  Leaves rounded or very obtuse at base.
    Capsule lobes rounded at apex; leaves crenate-serrate_____4. **H. utilis.**
    Capsule lobes deeply notched; leaves entire_____5. **H. chiapensis.**
  Leaves acute at base.
    Panicles scarcely longer than the petioles, few-flowered; leaves 10 to 15 cm. long_____6. **H. rovirosae.**
    Panicles half as long as the leaves or longer; leaves usually less than 10 cm. long.
      Branches of the inflorescence hirtellous_____7. **H. excelsa.**
      Branches of the inflorescence tomentulose.
        Flowers 6 to 7 mm. broad_____8. **H. elliptica.**
        Flowers 4 mm. broad_____9. **H. acutiflora.**

1. **Hippocratea celastroides** H. B. K. Nov. Gen. & Sp. **5**: 136. 1821.

Oaxaca, Veracruz, and Yucatán; type from Venta de Estola. Guatemala.

Glabrous scandent shrub; leaves slender-petiolate, 4 to 14 cm. long, bright green, entire or crenate-serrulate, acute or obtuse at base; flowers greenish yellow; capsule lobes rounded-obovate, rounded at apex. "Tulubalam" (Yucatán, Maya).

Specimens of this species from Yucatán were determined by Radlkofer as *H. grisebachii* Loes. That is a South American species, and perhaps synonymous with *H. celastroides*.

2. **Hippocratea acapulcensis** H. B. K. Nov. Gen. & Sp. **5**: 137. 1821.

Pristimera tenella Miers, Trans. Linn. Soc. Bot. **28**: 365. 1872.
Tontelea hookeriana Miers, Trans. Linn. Soc. Bot. **28**: 388. 1872.
Hippocratea pauciflora Rose, Contr. U. S. Nat. Herb. **5**: 197. 1899.

Sinaloa to Morelos and Oaxaca; type from Acapulco, Guerrero.

Scandent shrub, 3 to 4.5 meters long or more, glabrous throughout or nearly so; leaves 5 to 10 cm. long, bright green or gray-green, entire or crenulate; flowers green; sepals usually lacerate-dentate; petals glabrous, often denticulate; capsule lobes oblong to rounded-obovate, 3.5 to 7 cm. long, rounded or shallowly notched at apex. "Hierba del puyo" (Michoacán, Guerrero); "cuanabichi" (Oaxaca, Zapotec, *Reko*); "mata-piojo," "hierba del piojo," "bejuco de piojo," "pepitas de piojo" (seeds), "semillas de piojo" (Oaxaca).

A paste or tincture of the seeds is used to kill parasites upon the human body. A specimen from Michoacán (*Nelson* 6922) is remarkable for its narrow and very long (16 to 19 cm.) leaves, but it is probably not specifically different.

3. **Hippocratea uniflora** DC. Prodr. **1**: 567. 1824.

Hippocratea mexicana Miers, Trans. Linn. Soc. Bot. **28**: 352. 1872.
Hippocratea seleriana Loesener, Bull. Herb. Boiss. **7**: 561. 1899.

Durango to Oaxaca; original description based upon one of Sessé and Mociño's plates. Guatemala.

Erect shrub or tree with gray branches; leaves obovate-oblong or broadly obovate, 3.5 to 7 cm. long, 2 to 4 cm. wide, rounded or obtuse at base, broadly rounded at apex, gray-green, very thick, short-petiolate, entire or nearly so; flowers about 7 mm. broad; capsule lobes rounded-obovate, about 5.5 cm. long and 4.5 cm. wide, deeply notched at apex.

4. **Hippocratea utilis** Rose, Contr. U. S. Nat. Herb. **5**: 197. 1899.

Mountains of Sinaloa; type from Colomas.

High-climbing shrub; leaves elliptic or broadly elliptic, 5 to 8.5 cm. long, 3 to 5 cm. wide, bright green, cremate, petiolate, obtuse to short-acuminate

at apex; capsule lobes elliptic-oblong, 3 to 4.5 cm. long, 2.5 cm. wide, rounded at apex. "Bejuco colorado."

The tough stems are used for binding fences, the framework of houses, and similar purposes.

5. **Hippocratea chiapensis** Standl., sp. nov.

Type from San Vicente, Chiapas (*Goldman* 888; U. S. Nat. Herb. no. 470689).

Erect shrub or tree; leaves oval or oval-elliptic, 4.5 to 7 cm. long, 3 to 4.5 cm. wide, rounded at apex and sometimes very shortly pointed, coriaceous, bright green, short-petiolate; branches of the inflorescence tomentulose; flowers 8 mm. broad, the disk and petals glabrous; capsule glabrous, the lobes broadly obovate, about 6.5 cm. long and 5 cm. wide.

6. **Hippocratea rovirosae** Standl., sp. nov.

Type from Mayito, Tabasco (*Rovirosa* 411; U. S. Nat. Herb. no. 935856).

Probably scandent, the branchlets slender, brown; leaves short-petiolate, oblong-obovate or narrowly elliptic-oblong, 3 to 5.5 cm. wide, short-acuminate at apex, rather coarsely crenate, bright green; panicles few-flowered, tomentulose; flowers 5 mm. broad, the petals obtuse, barbate within.

7. Hippocratea excelsa H. B. K. Nov. Gen. & Sp. **5**: 138. 1821.

Type collected between Acapulco and Mazatlán, Guerrero. Reported from Panama.

Tall tree; leaves short-petiolate, elliptic-oblong, 7 to 7.5 cm. long, 3.5 cm. wide, acuminate, undulate-crenate; panicles many-flowered.

8. Hippocratea elliptica H. B. K. Nov. Gen. & Sp. **5**: 138. 1821.

Hippocratea meizantha Blake, Contr. Gray Herb. **52**: 72, 1917.

Guerrero and Morelos; type collected between Taxco and Tepecoacuilco, Guerrero.

Scandent shrub; leaves short-petiolate, elliptic or oval-elliptic, 5 to 9 cm. long, 2.5 to 4 cm. wide, obtuse or acute, obscurely crenate-serrulate, bright green; petals barbate within.

9. Hippocratea acutiflora DC. Prodr. **1**: 568. 1824.

Described from Mexico, the locality not known.

Scandent shrub; leaves elongate-elliptic, 5 to 6.5 cm. long, 1.5 to 2 cm. wide, acute, subserrate, bright green; panicles 2.5 to 6.5 cm. long; capsule lobes obovate.

85. STAPHYLEACEAE. Bladdernut Family.

Trees or erect shrubs; leaves opposite, usually pinnately compound, stipulate; flowers perfect, in terminal or axillary racemes or panicles; sepals 5; stamens 5; ovary usually 3-celled; fruit 3-celled, capsular or leathery and indehiscent.

Fruit thin, inflated and bladder-like; ovary 3-parted_____1. **STAPHYLEA.**
Fruit leathery, indehiscent; ovary 3-lobed_____2. **TURPINIA.**

1. STAPHYLEA L. Sp. Pl. 270. 1753.

1. **Staphylea pringlei** S. Wats. Proc. Amer. Acad. **25**: 146. 1890.

Nuevo León to Hidalgo; type from the Sierra Madre, near Monterrey, Nuevo León.

Large shrub or small tree, 4.5 to 6 meters high; leaflets 3, oval-elliptic, 5 to 10 cm. long, 3 to 6 cm. wide, cuspidate-acuminate, finely serrulate, villosulous beneath when young but soon glabrate; flowers white, the panicles often

longer than the leaves; petals 7 mm. long; fruit about 5 cm. long and 3.5 cm. broad, thin, 3-lobed at apex.

Doubtless through a slip of the pen, this species was listed by Pax[1] as "*S. mexicana* Watson."

2. TURPINIA Vent. Choix Pl. Cels. 31. 1803.

Glabrous trees or shrubs; leaves with 1 or more leaflets; flowers perfect, in terminal panicles; petals orbicular or nearly so; fruit subglobose, fleshy or coriaceous, few or many-seeded.

Leaves 1-foliolate ..... 1. T. insignis.
Leaves 3 to 9-foliolate ..... 2. T. occidentalis.

1. **Turpinia insignis** (H. B. K.) Tulasne, Ann. Sci. Nat. III. 7: 296. 1847.
Lacepedea insignis H. B. K. Nov. Gen. & Sp. 5: 143. *pl. 444.* 1821.
Veracruz; type from Jalapa.
Shrub or small tree; leaves persistent, petiolate, the leaflet elliptic or elliptic-oblong, 7 to 15 cm. long, abruptly short-acuminate at apex, entire or obscurely crenate-serrulate; panicles about as long as the leaves; flowers white, 5 mm. long.

2. **Turpinia occidentalis** (Swartz) Don, Hist. Dichl. Pl. 2: 3. 1832.
Staphylea occidentalis Swartz, Prodr. Veg. Ind. Occ. 55. 1788.
? *Lacepedea pinnata* Schlecht. Linnaea 10: 240. 1835.
Veracruz and Puebla. West Indies and Central America.
Shrub or small tree; leaflets elliptic-lanceolate, elliptic-oblong, or ovate-lanceolate, 4 to 10 cm. long, acuminate or long-acuminate, crenate-serrate; panicles usually large but few-flowered; flowers 5 to 7 mm. long, white; fruit 1 to 1.5 cm. in diameter.

Schlechtendal's species was based upon fruiting material, but it is probably synonymous with *T. occidentalis*. *Turpinia paniculata* Vent. has been reported from Mexico, and may perhaps occur there, since it is found in Central America. It is distinguished by its smaller flowers.

DOUBTFUL SPECIES.

TURPINIA ? TOMENTOSA Llave & Lex. Nov. Veg. Descr. 1: 24. 1824.

86. ICACINACEAE. Icacina Family.

Shrubs or trees; leaves chiefly alternate, usually entire, estipulate; flowers small, perfect or unisexual; calyx inferior, 4 or 5-lobate, the lobes commonly imbricate; petals 4 or 5, sometimes united below, valvate; stamens as many as the petals and alternate with them; ovary usually 1-celled; fruit drupaceous, 1-celled, 1-seeded.

Flowers 4-parted ..... 1. CALATOLA.
Flowers 5-parted.
Petals hairy inside ..... 2. MAPPIA.
Petals glabrous ..... 3. OECOPETALUM.

1. CALATOLA Standl., gen. nov.

Trees; leaves alternate, petiolate, entire or sinuate-serrate; flowers dioecious, the staminate bracteate, in long slender solitary axillary spikes, the pistillate axillary, solitary and pedunculate or in few-flowered spikelike inflorescences; staminate calyx 4-lobate, the corolla 4-parted, the lobes concave, valvate; stamens 4, alternate with the corolla lobes, erect, basifixed, the filaments very

[1] In Engl. & Prantl, Pflanzenfam. 3[5]: 261. 1893.

short, adnate to the corolla, the anthers oblong, 2-celled, dehiscent by lateral slits; pistillate calyx 4-lobate; ovary 1-celled; fruit drupaceous, large, globose or ovoid, with thin flesh, the putamen osseous, bicristate and with numerous irregular dentate crests over the whole surface.

One other species is known, a native of Costa Rica.

Leaves densely pubescent beneath ---------- 1. C. mollis.
Leaves glabrous beneath or nearly so ---------- 2. C. laevigata.

1. **Calatola mollis** Standl., sp. nov.

Puebla; type from Zacatlán (*F. Salazar*, April 3, 1913).

Tree, about 20 meters high; leaves oval-elliptic to oblong-obovate, 20 to 30 cm. long, acute or abruptly short-acuminate, obtuse or rounded at base; staminate spikes 8 to 20 cm. long; corolla 2 mm. long; fruit 5 to 5.5 cm. long, 4 to 4.5 cm. thick, densely tomentose. "Nuez de calatola," "calatolazno" (tree), "colas de ratas" (spikes).

The seeds are said to have vomitive-purgative properties.

2. **Calatola laevigata** Standl., sp. nov.

Oaxaca; type from Cafetal San Carlos, Cerro Espino, altitude 800 meters (*Reko* 3440; U. S. Nat. Herb. no. 988705).

Leaves oblong or elliptic-oblong, 11 to 16 cm. long, acute, obtuse or acute at base; staminate spikes 4 to 6 cm. long or larger; pistillate flowers in short dense spikes; young fruit glabrate. "Palo de tinta."

2. MAPPIA Jacq. Pl. Hort. Schoenbr. 1: 22. 1797.

1. **Mappia mexicana** Robins & Greenm. Amer. Journ. Sci. 50: 150. 1895.

Tamaulipas and San Luis Potosí; type from Micos, San Luis Potosí.

Shrub, 1.5 to 3 meters high; leaves short-petiolate, oblanceolate or oblong-obovate, 7.5 to 10.5 cm. long, obtuse, cuneate at base, glabrous; flowers in long-pedunculate cymose panicles; calyx minutely pubescent; petals 2.5 mm. long; fruit black, 1.5 cm. long.

3. OECOPETALUM Greenm. & Thomps. Ann. Mo. Bot. Gard. 1: 408. 1914.

A single species is known.

1. **Oecopetalum mexicanum** Greenm. & Thomps. Ann. Mo. Bot. Gard. 1: 408. *pl. 25.* 194.

Type from mountains near Misantla, Veracruz.

Leaves short-petiolate, oblong or elliptic-oblong, 10 to 25 cm. long, short-acuminate, acute at base, entire, glabrous or nearly so; flowers in axillary pedunculate pubescent cymes; calyx tomentose, the lobes ovate, obtuse; petals 8 mm. long; ovary glabrous.

87. ACERACEAE. Maple Family.

1. ACER L. Sp. Pl. 1054. 1753.

Trees or shrubs; leaves opposite, simple or pinnate, deciduous, petiolate; flowers unisexual, dioecious or polygamo-dioecious; calyx 4 or 5-lobed or parted; petals as many as the calyx lobes or none; stamens 4 to 12; fruit of 2 large united samaras.

Some of the maples make excellent shade trees and they are often cultivated for this purpose. One European species, *A. pseudoplatanus* L. ("sicomoro"), the sycamore maple, is said to be grown in Mexico. In most of the American species of the genus the sap is sweet, and by evaporation this yields maple sugar, an article well known to the Indians of North America, and still harvested in large quantities in the United States each year.

Leaves pinnate.
  Young branchlets densely pubescent ---------- 1. A. serratum.
  Young branchlets glabrous ---------- 2. A. orizabense.
Leaves simple, lobed.
  Leaves truncate or rounded at base ---------- 3. A. mexicanum.
  Leaves cordate at base ---------- 4. A. brachypterum.

1. **Acer serratum** Pax, Bot. Pahrb. Engler **6**: 296. 1885.
  Negundo mexicanum DC. Prodr. **1**: 545. 1824.
  Acer mexicanum Pax, Bot. Jahrb. Engler **7**: 212. 1886. Not *A. mexicanum* A. Gray, 1862.
  Tlaxcala, Mexico, Puebla, and Chiapas, and probably elsewhere. Guatemala.
  Tree; leaflets 3, lanceolate to broadly ovate, 6 to 12 cm. long, long-acuminate, coarsely and irregularly serrate, densely pubescent beneath; flowers dioecious; petals none; samaras about 3 cm. long, pubescent. "Acezintle," "acecincle" (Mexico); "arce."

2. **Acer orizabense** (Rydb.) Standl.
  Negundo orizabense Rydb. Bull. Torrey Club **40**: 55. 1913.
  Veracruz, Mexico, and Michoacán; type from Orizaba, Veracruz.
  Tree, the young branches green; leaflets 3, lanceolate, ovate, or rhombic-oval, 5 to 15 cm. long, acute or acuminate, serrate, soon glabrate beneath; petals none; samaras 3.5 to 4 cm. long.
  This is closely related to *A. negundo* L., the box-elder of the United States, and may not be distinct.

3. **Acer mexicanum** A. Gray, Proc. Amer. Acad. **5**: 176. 1862.
  Described from Nuevo León.
  Leaves dilatate-cuneate and 3-lobed or 5-lobed, about 5 cm. broad, the lobes sinuate, glabrate; flowers polygamous; samaras glabrate, the wing 1.5 to 2 cm. long.

4. **Acer brachypterum** Woot. & Standl. Contr. U. S. Nat. Herb. **16**: 146. 1913.
  Mountains of Chihuahua and Sonora; type from San Luis Mountains. Southern New Mexico.
  Tree, 18 meters high or less, the trunk sometimes 70 cm. in diameter, with spreading crown; leaves 5-lobed, 6 to 8 cm. wide, paler beneath and velutinous, the lobes sinuate or entire; samaras glabrate, the wings about 1.5 cm. long.
  This is closely related to *A. grandidentatum* Nutt., of the western United States and may be only a form of that species. The leaves turn red in autumn.

88. AESCULACEAE. Horse-chestnut Family.

Trees or shrubs; leaves opposite, estipulate, digitately 3 to 9-foliolate, the leaflets serrate or entire; flowers paniculate or racemose, terminal, polygamous, irregular; calyx 5-lobed; petals 4 or 5, unequal, clawed; stamens 5 to 8; fruit a coriaceous capsule, subglobose or 3-lobate, usually 3-celled; seeds one in each cell.

Calyx lobed nearly to the base; leaves persistent; leaflets 3 ------ 1. BILLIA.
Calyx lobed to the middle or less deeply; leaves deciduous; leaflets usually 5 or 7 ---------- 2. AESCULUS.

1. BILLIA Peyr. Bot. Zeit. 16: 153. 1858.

1. **Billia hippocastanum** Peyr. Bot. Zeit. **16**: 153. 1858.
  Aesculus mexicana Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. **1**: 212. 1880.
  Veracruz and Oaxaca; type from Oaxaca.

Tree; leaves long-petiolate, the leaflets long-stalked, lanceolate or oblong-lanceolate, 7 to 20 cm. long, long-acuminate, entire or nearly so, lustrous, glabrous; panicles shorter than the leaves; calyx 8 to 10 mm. long, puberulent; petals deep red, 1.5 to 2 cm. long.

One other species of the genus is known, *B. columbiana* Planch. & Lind., ranging from Guatemala to Colombia.

2. AESCULUS L. Sp. Pl. 344. 1753.

The species which grow in the United States are known by the names "horse-chestnut" and "buckeye." They are mostly large trees and are often planted for shade. Ramírez reports that *Aesculus hippocastanum* L. is planted in Mexico and is known as "castaño de Indias." The seeds of this species are bitter and poisonous. They contain much starch, and the bitter principle can be removed by alcohol or other agents and the starch extracted in an innocuous condition. The leaves contain a bitter principle, esculin. An extract of the wood is employed for dyeing silk black. The seeds of *Aesculus californica* Nutt. were used as food by the Indians of California, after having been roasted and the poisonous principle washed from the kernels with water. In the southern United States the seeds of various species have been used for stupefying fish, being first ground and mixed with flour, then thrown into the water. The roots also have been used as a substitute for soap in washing woolen and cotton goods.

1. **Aesculus parryi** A. Gray, Proc. Amer. Acad. 17: 200. 1882.

Northern Baja California.

Shrub, 1 to 2.5 meters high; leaflets obovate or oblong-obovate, 4 to 11 cm. long, sessile or short-stalked, obtuse, entire or nearly so, tomentulose beneath; panicles narrow, 8 to 20 cm. long; calyx 7 to 8 mm. long, tomentose; fruit tomentose and somewhat tuberculate.

89. SAPINDACEAE. Soapberry Family.

Tree or shrubs, rarely herbs, often scandent and tendril-bearing; leaves usually alternate, compound or sometimes simple, usually persistent; flowers small, usually polygamo-dioecious; sepals 4 or 5, free or connate; petals 3 to 5, or absent; stamens usually 8; fruit capsular, drupaceous, baccate, or samaroid, 1 to 4-celled.

Leaves with a terminal leaflet, or sometimes simple.
- Plants scandent; leaves often twice compound.
  - Fruit a 3-winged capsule or of 3 samaras.
    - Fruit of 3 samaras, the seeds borne above the middle of the samara. **1. SERJANIA.**
    - Fruit a 3-winged papery capsule, the seeds borne at the middle of the cell. **2. URVILLEA.**
  - Fruit not winged, capsular.
    - Fruit thin and inflated, the cells loculicidal____**3. CARDIOSPERMUM.**
    - Fruit thick and hard, not inflated, the cells septicidal. **4. PAULLINIA.**
- Plants erect; leaves simple or once pinnate.
  - Fruit not winged.
    - Fruit indehiscent; flowers small, white or greenish__**5. ALLOPHYLUS.**
    - Fruit dehiscent; flowers large, purplish pink_____**6. UNGNADIA.**

Fruit winged.
Leaves compound ..... 7. **THOUINIA.**
Leaves simple.
Fruit 3-celled ..... 8. **DODONAEA.**
Fruit 1-celled ..... 9. **NEOPRINGLEA.**
Leaves pinnate, the terminal leaflet absent.
Seeds 2 in each cell ..... 10. **EXOTHEA.**
Seeds 1 in each cell.
Fruit dehiscent.
Sepals distinct ..... 11. **CUPANIA.**
Sepals united ..... 12. **MATAYBA.**
Fruit indehiscent.
Fruit of usually 3 samaras ..... 13. **THOUINIDIUM.**
Fruit baccate or drupaceous.
Fruit pubescent, not lobed; leaflets 4 ..... 14. **TALISIA.**
Fruit glabrous, usually deeply 2-lobed but only one of the carpels developing; leaflets usually more than 4 ..... 15. **SAPINDUS.**

1. **SERJANIA** Schumach. Skrivt. Naturh. Selsk. (Kjøbenhavn) 3 [2]: 125. 1794.

References: Radlkofer, Monographie der Sapindaceen-Gattung *Serjania*, pp. 1–392. 1875; Radlkofer, Ergänzungen zur Monographie der Sapindaceen-Gattung *Serjania*, pp. 1–195. 1886.

Scandent shrubs; leaves trifoliolate, 2 or 3 times ternate, pinnate, or bipinnate; flowers polygamous, in axillary racemes, white or whitish; sepals 5, the outer ones smaller; petals 4; stamens 8; fruit of 3 samaras, these seed-bearing at the apex.

The stems of some species are used in Central America for making coarse baskets. All the species are believed to possess narcotic poisonous properties of varying intensity, and some of them are employed for stupefying fish.

Partition walls (dissepiments) of the fruit broad, nearly as broad as the fertile portion of the cell, the cells therefore firmly united.
Woody portion of the stem simple, of a single central body.
Leaves trifoliolate ..... 1. **S. trifoliolata.**
Leaves triternate or bipinnate.
Leaves 3 or 4 times ternate; stems glabrate ..... 2. **S. cambessediana.**
Leaves bipinnate; stems hirsute ..... 3. **S. adiantoides.**
Woody portion of the stem compound, consisting of a large central portion and 3 to 5 small outer ones.
Leaves trifoliolate ..... 4. **S. heterocarpa.**
Leaves triternate, pinnate, or bipinnate.
Outer woody bodies of the stem strongly complanate, contiguous. Leaves biternate ..... 5. **S. insignis.**
Outer woody bodies subterete.
Branches acutely angulate, canaliculate; outer fascicles of the wood not immersed in the central body.
Leaves biternate; branches pilose throughout ..... 6. **S. impressa.**
Leaves 2 or 3 times pinnate; branches pilose only on the angles. 7. **S. trachygona.**
Branches subterete or obtusely angulate, the outer fascicles more or less immersed in the central body.
Branches glabrous or the younger ones slightly pubescent. Leaves biternate, glabrous or nearly so ..... 8. **S. brachystachya.**

Branches densely tomentose or pilosulous with yellowish or sordid hairs.
Branches very densely tomentose; leaves pinnate.
9. S. schiedeana.
Branches finely tomentulose or pilose; leaves biternate.
Leaflets soft-pilose beneath.
Mature fruit about 2 cm. long----------**10. S. triquetra.**
Mature fruit about 1 cm. long----------**11. S. oaxacana.**
Leaflets subglabrous----------**12. S. goniocarpa.**
Partition walls of the fruit narrow, less than half as broad as the fertile portion, the cells lightly coherent.
Cells of the fruit strongly compressed. Leaves 3-foliolate.
13. S. cardiospermoides.
Cells not or scarcely compressed.
Woody portion of the stem compound, with small separate outer fascicles; cells of the fruit sulcate or scrobiculate between the nerves.
Leaves 3-foliolate.
Leaflets densely pubescent beneath; fruit pubescent----**14. S. plicata.**
Leaflets glabrous----------**15. S. rekoi.**
Leaves biternate.
Outer sepals glabrous; leaflets subcoriaceous, mostly lance-oblong.
16. S. caracasana.
Outer sepals puberulent or tomentulose; leaflets broader.
Petals 3 mm. long----------**17. S. brachylopha.**
Petals 3.5 to 5 mm. long.
Outer woody fascicles subterete; branches deeply sulcate; terminal leaflet obovate or subrhombic----------**18. S. paniculata.**
Outer fascicles all or partly applanate; branches lightly striate; terminal leaflet oblong----------**19. S. scatens.**
Woody portion of the stem simple, without outer fascicles; cells of the fruit not sulcate or scrobiculate.
Cells of the fruit lenticular; sepals densely white-tomentose. Leaves biternate.
Branches deeply 5-sulcate, usually aculeolate; scales of the upper petals with short emarginate crests----------**20. S. mexicana.**
Branches 5-angulate, unarmed; scales of the upper petals large, bicorniculate-bifid----------**21. S. brachycarpa.**
Cells inflated, more or less produced beyond the axis; sepals glabrous or variously pubescent.
Branches 8 to 10-striate or 8 to 10-costate.
Terminal leaflet about 5 cm. long, ovate, elliptic, or subrhombic, sharply serrate----------**22. S. vesicosa.**
Terminal leaflet rarely more than 2 cm. long, oblong, ovate-oblong or spatulate-obovate, coarsely crenate or entire.
Leaflets mostly oblong-lanceolate or oblong-ovate, densely puberulent beneath----------**23. S. palmeri.**
Leaflets mostly spatulate-obovate, glabrate------**24. S. rutaefolia.**
Branches 5 or 6-sulcate.
Leaves all or chiefly trifoliolate.
Terminal leaflet 1.5 to 2 cm. long----------**25. S. albida.**
Terminal leaflet 4 to 8 cm. long.
Leaflets serrate or dentate----------**26. S. grosii.**
Leaflets entire, or with a small lobe on each side at the base.
27. S. emarginata.

Leaves biternate or bipinnate.
  Leaflets entire.
    Leaflets glabrous except along the costa--------28. S. flaviflora.
    Leaflets pubescent on one or both surfaces.
      Leaflets ovate-lanceolate or ovate, very acute.
        29. S. subtriplinervis.
      Leaflets elliptic or elliptic-ovate, obtuse, the upper ones short-cuspidate.
        Cells of the fruit glabrate----------30. S. fuscopunctata.
        Cells of the fruit densely pubescent--------31. S. sordida.
  Leaflets serrate or dentate.
    Leaves biternate.
      Plants subherbaceous; fruit suborbicular--32. S. macrococca.
      Plants fruticose; fruit much longer than broad.
        Leaflets with few serrations; branches canaliculate-sulcate, obtusely angulate----------33. S. racemosa.
        Leaflets closely subduplicate-serrate; branches striate-sulcate, subterete----------34. S. polystachya.
    Leaves pinnate or bipinnate.
      Leaflets glabrous----------35. S. californica.
      Leaflets pubescent beneath.
        Fruit broadest toward the apex.
          Cells of the fruit longer than broad--------36. S. incisa.
          Cells of the fruit broader than long--37. S. sphenocarpa.
        Fruit broadest at the base.
          Mature fruit 10 to 12 mm. long; leaflets conspicuously crenate or lobate----------38. S. cystocarpa.
          Mature fruit 20 mm. long; leaflets with only a few remote teeth----------39. S. pacifica.

1. Serjania trifoliolata Radlk. Contr. U. S. Nat. Herb. 1: 317. 1895.

Sinaloa to Guerrero; type from Manzanillo, Colima.

Stems glabrous, 6-costate; leaflets ovate-rhombic to suborbicular, 3 to 8 cm. long, obtuse to acuminate, coarsely serrate-dentate, thin, glabrous; sepals glabrate; petals 2.5 mm. long; fruit about 1.5 cm. long, glabrous.

2. **Serjania cambessediana** Schlecht. & Cham. Linnaea 5: 214. 1830.

Veracruz and Oaxaca; type from Jalapa, Veracruz.

Stems glabrate, obtusely 6-angulate; leaflets ovate-lanceolate, elliptic, ovate, or rhombic, 0.5 to 4 cm. long, obtuse to acuminate, serrate-dentate, glabrous or nearly so; outer sepals subglabrous, the inner tomentulose; petals 2.5 mm. long; fruit 2.2 cm. long, glabrate.

3. **Serjania adiantoides** Radlk. Field Mus. Bot. 1: 403. 1898.

Known only from the type locality, Buenavista Xbac, Yucatán.

Stems subherbaceous, hirsute on the angles; leaves subbipinnate, the pinnae 4 pairs. "Bui."

4. **Serjania heterocarpa** Standl., sp. nov.

Type from Monte Alban, Oaxaca (*Pringle* 5835; U. S. Nat. Herb. no. 316723).

Stems pilosulous, obtusely 5-angulate, the woody portion with 3 obtusely trigonous outer fascicles; leaves trifoliolate, the leaflets ovate-elliptic or broadly rhombic, 1.5 to 3 cm. long, acute or obtuse, duplicate-dentate, pilosulous on both surfaces; fruit about 12 mm. long and 17 mm. broad, densely puberulent, the cells inflated, the wing 2.5 to 4 mm. wide.

The fruit is very different from that of any of the Mexican species seen by the writer, in its general appearance suggesting that of the genus *Paullinia*.

5. **Serjania insignis** Radlk. Monogr. Serjan. 331. 1875.

Reported from Mexico, without definite locality. Panama.

Stems puberulent; leaflets elliptic, 9 cm. long or less, shortly obtuse-acuminate, obscurely dentate, hirtellous on the nerves; outer sepals pubescent, the inner densely tomentulose; petals 3 mm. long; fruit 2 cm. long, 1.6 cm. wide, the cells hirtellous or glabrate.

6. **Serjania impressa** Radlk. Monogr. Serjan. 323. 1875.

Known only from the type locality, Valley of Córdoba, Veracruz.

Stems 6-sulcate; leaflets elliptic, 7 cm. long or less, acute or obtuse, crenate-dentate, pubescent beneath; outer sepals tomentulose; fruit 3 to 3.5 cm. long, 2.8 cm. wide, the cells pilose.

7. **Serjania trachygona** Radlk. Monogr. Serjan. 327. 1875.

Campeche. Panama.

Stems acutely 6-angulate; leaflets ovate, oblong, or rhombic, 0.5 to 3.5 cm. long, obtuse or acuminate, incised-dentate or lobate, setulose-pilose on the nerves; outer sepals hirtellous, the inner tomentulose; petals 3.5 to 4 mm. long.

8. **Serjania brachystachya** Radlk. Monogr. Serjan. 310. 1875.

Colima to Oaxaca; type from San Agustín, Oaxaca.

Stems 6-striate; leaflets rhombic-ovate to rhombic-elliptic, 2 to 5 cm. long, obtuse to short-acuminate, coarsely crenate-dentate, glabrous or nearly so; outer sepals glabrate, the inner tomentulose; petals 3.5 mm. long; fruit about 2 cm. long and nearly as broad, the cells puberulent.

9. **Serjania schiedeana** Schlecht. Linnaea **18**: 44. 1844.

Jalisco and Morelos and probably elsewhere; type locality not known.

Stems obtusely trigonous; leaflets 5, broadly rhombic to elliptic-oblong, 3 to 5.5 cm. long, obtuse or short-acuminate, coarsely crenate, densely pubescent on both surfaces; sepals tomentose; petals 4 mm. long; fruit about 2.5 cm. long and 2 cm. wide, densely pubescent.

10. **Serjania triquetra** Radlk. Monogr. Serjan. 305. 1875.

Morelos, Veracruz, Oaxaca, and Chiapas. Central America.

Stems trigonous or terete, 6-sulcate; leaflets ovate, elliptic, or rhombic, 3 to 8 cm. long, obtuse to acuminate, coarsely incised-dentate, sometimes lobate, densely pubescent, especially beneath; petals 4 mm. long; fruit about 2 cm. long and 1.5 cm. broad. "Carretilla" (Oaxaca, Guatemala, *Seler*).

11. **Serjania oaxacana** Standl., sp. nov.

Type from San Gerónimo, Oaxaca (*Purpus* 6689; U. S. Nat. Herb. no. 567063).

Branches obtusely trigonous, tomentulose; leaves biternate, the leaflets rhombic or rhombic-ovate, 1.5 to 4.5 cm. long, acute or acuminate, coarsely incised-crenate and often lobate, glabrate above, densely puberulent beneath; outer sepals glabrate, the inner tomentulose; petals 2.5 mm. long; fruit 9 to 12 mm. long, 14 mm. broad, appressed-pilosulous, densely so on the cells.

12. **Serjania goniocarpa** Radlk. Monogr. Serjan. 309. 1875.

Veracruz; type from Mirador.

Stems puberulent, trigonous; leaflets ovate, 10 cm. long or smaller, subobtuse, coarsely serrate-dentate, puberulent or glabrate; sepals tomentulose; petals 3 mm. long; fruit 2.5 to 3 cm. long and nearly as broad, puberulent, the cells tomentose.

13. **Serjania cardiospermoides** Schlecht. & Cham. Linnaea **6**: 418. 1831.

Veracruz and Hidalgo; type collected near Papantla, Veracruz. Central America.

Stems slender, sulcate; leaflets ovate or rhombic, 4 to 8 cm. long, the terminal one very long-petiolulate, acuminate, with 1 to 3 coarse teeth on each side, thin, densely puberulent or glabrate; sepals puberulent; fruit glabrate.

14. Serjania plicata Radlk. Monogr. Serjan. 167. 1875.

Known only from the original collection, from Yucatán or Tabasco.

Stems obtusely trigonous, pubescent; leaflets ovate, 8 cm. long or less, crenate-dentate, soft-pubescent beneath; fruit 4 cm. long, 2.4 cm. wide, short-pubescent, the cells subtomentose.

15. Serjania rekoi Standl., sp. nov.

Type from Las Pilas (Cerro Espino), Oaxaca, altitude 400 meters (*Reko* 3509; U. S. Nat. Herb. no. 842577).

Sap milky; stems glabrous, acutely trigonous, 6-sulcate, the 3 outer fascicles of wood subterete; leaflets ovate or oblong-ovate, 5 to 7.5 cm. long, acuminate, coarsely sinuate-serrate, subcoriaceous, lustrous, glabrous; outer sepals glabrous; petals 3 mm. long; fruit about 2 cm. long and nearly as broad, glabrous, the cells subglobose.

16. Serjania caracasana (Jacq.) Willd. Sp. Pl. **2**: 465. 1799.

Paullinia caracasana Jacq. Pl. Hort. Schönbr. **1**: 52. *pl. 99*. 1797.

Guerrero. Central America and South America; type from Caracas, Venezuela.

Stems glabrous, 6 to 8-striate; leaflets mostly lance-oblong, 6 to 15 cm. long, acuminate, remotely serrate-dentate, subcoriaceous, lustrous, glabrous; petals 4 to 5 mm. long; fruit 2.5 cm. long and nearly as broad, glabrous.

17. Serjania brachylopha Radlk. Contr. U. S. Nat. Herb. **1**: 367. 1895.

Known only from the type locality, Tequila, Jalisco.

Stems sparsely pilose, 6-sulcate; leaflets ovate-oblong to broadly rhombic, 3 to 5 cm. long, acute, subduplicate-serrate, thin, glabrous or nearly so; outer sepals puberulent, the inner tomentulose.

18. Serjania paniculata H. B. K. Nov. Gen. & Sp. **5**: 86. 1821.

Guerrero. Northern South America; type from Venezuela.

Stems glabrate, 6 to 8-costate; leaflets elliptic to subrhombic, 4 to 7 cm. long, short-acuminate, coarsely crenate-serrate, thin, barbate beneath in the axils of the veins; sepals tomentulose; petals 4 to 5 mm. long; fruit about 2 cm. long and 1.5 cm. wide, the cells densely pilosulous.

19. Serjania scatens Radlk. Monogr. Serjan. 213. 1875.

Reported by Radlkofer from Yucatán or Tabasco. Central America, Venezuela, and Cuba.

Stems subterete, puberulent or glabrate; leaflets oblong, obtuse to acuminate, distantly crenate, thin, glabrous; sepals tomentulose; cells of the fruit subtomentose.

20. Serjania mexicana (L.) Willd. Sp. Pl. **2**: 465. 1799.

Paullinia mexicana L. Sp. Pl. 366. 1753.

Sonora to Veracruz and Oaxaca. Central America, Jamaica, and northern South America.

Stems usually aculeate, glabrous or pubescent; leaflets oblong to elliptic, ovate, or obovate, 4 to 13 cm. long, acuminate to retuse, entire or remotely dentate, thick, usually glabrous; sepals white-tomentulose; petals 3 mm. long; fruit 2 to 2.5 cm. long and nearly as broad, commonly glabrous. "Quirote culebra" (Sonora, *Palmer*); "barbasco" (Sinaloa, Guatemala, Honduras); "sierrilla" (Jalisco); "diente de culebra" (Sonora); "cuauhmecatl,"

"cuamecatl" (Nahuatl; sometimes written "quaumecatl"); "turizo," "bejuco espinoso" (Costa Rica).

The flowers are white and fragrant. The stems are used as a substitute for rope. The plant is employed in some localities for stupefying fish, and it is used in Mexico as a remedy for rheumatism and syphilitic affections.

This species or a related one is figured by Hernández[1] and described in a chapter entitled "De Quauhmecatl Zarsaparilla II. & III." The people of "Yamguitlan" (Yauhuitlán, Oaxaca ?), he says, call the plant "Cozticuizti palancapatli," and those of Michoacán "ychuanitzoz." He states that its properties are similar to those of sarsaparilla (*Smilax* spp.).

21. Serjania brachycarpa A. Gray; Radlk. Monogr. Serjan. 259. 1875.

Type from Victoria, Tamaulipas. Western Texas.

Stems subhirsute; leaflets ovate-lanceolate or ovate, 1.5 to 3.5 cm. long, mucronulate, remotely serrate, villous-tomentose beneath, thin; sepals subtomentose; petals 2.5 mm. long; fruit about 1 cm. long and broad, the cells puberulent or glabrate.

22. Serjania vesicosa Radlk. Monogr. Serjan. 277. 1875.

Known only from Querétaro, the type locality.

Stems ferruginous-tomentose; leaflets ovate, elliptic, or subrhombic, 5 cm. long or less, acuminate, sharply serrate, tomentose beneath; sepals tomentose-pilose; petals 3 mm. long; fruit 1.5 to 1.8 cm long, 1.3 cm wide, glabrous.

23. Serjania palmeri S. Wats Proc. Amer. Acad. 24: 45. 1889.

Known only from the type locality, Guaymas, Sonora.

Stems densely tomentulose; leaflets 0.5 to 2.5 cm. long, acute or acutish, mostly entire, finely puberulent on the upper surface; sepals tomentulose; fruit 1.5 to 2 cm. long, puberulent.

24. Serjania rutaefolia Radlk. Contr. U. S. Nat. Herb. 1: 316. 1895.

Known only from the type locality, Agiabampo, Sonora.

Stems gray-puberulent, terete; leaflets 1 to 2.5 cm. long, obtuse or retuse, entire or incised-dentate, puberulent at first; sepals tomentulose; petals 4.5 mm. long.

25. Serjania albida Radlk. Contr. U. S. Nat. Herb. 1: 367. 1895.

Known only from the type locality, Santa Agueda, Baja California.

Stems 6-angulate, glabrous; leaflets ovate, 1.5 cm. long or less, obtuse, subtrilobate, pale green, glabrous; sepals puberulent.

The fruit is not known, and the generic position of the plant is doubtful.

26. Serjania grosii Schlecht. Linnaea 18: 42. 1844.

Oaxaca and perhaps elsewhere; described from Mexico, the exact locality not known. Central America.

Stems sparsely pilose or glabrous, 5 or 6-sulcate; leaflets ovate or rhombic, 5 to 8 cm. long, acute or acuminate, glabrous or pilosulous beneath; sepals tomentulose or the outer ones glabrate; petals 1.5 to 2 mm. long; fruit glabrous or nearly so.

The specific name is given incorrectly by Hemsley[2] as "*grayii*."

27. Serjania emarginata H. B. K. Nov. Gen. & Sp. 5: 84. 1821.

Serjania acapulcensis H. B. K. Nov. Gen. & Sp. 5: 84. 1821.

Guerrero; type from mountains near La Venta de Tierra Colorada.

Stems glabrous, 5 or 6-sulcate; leaflets ovate, 3 to 4 cm. long, obtuse, glabrous; sepals tomentulose; petals 1.8 mm. long; fruit 1.5 cm. long and wide, glabrous.

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[1] Thesaurus 289. 1651.

[2] Biol. Centr. Amer. Bot. 1: 206. 1880.

28. Serjania flaviflora Radlk. Bull. Herb. Boiss. II. 3: 211. 1903.

Known only from the type locality, Monte Alban, Oaxaca.

Stems glabrous or nearly so; leaflets ovate-lanceolate, 5 cm. long or less, acute or acuminate; outer sepals puberulent, the inner tomentulose; petals 4 mm. long.

29. Serjania subtriplinervis Radlk. Monogr. Serjan. 273. 1875.

Michoacán to Oaxaca; type from Tanetze, Oaxaca.

Stems tomentulose; leaflets ovate to lance-oblong, 2 to 6.5 cm. long, densely pubescent beneath; sepals tomentose; fruit densely pilose when young.

30. Serjania fuscopunctata Radlk. Contr. U. S. Nat. Herb. 1: 315. 1895.

Known only from the type locality, Manzanillo, Colima.

Stems pilosulous or glabrate; leaflets ovate or elliptic-ovate, 3 to 4.5 cm. long; pubescent; sepals canescent-tomentulose; sepals 4 mm. long; fruit 2.7 cm. long, 2 cm. wide.

31. Serjania sordida Radlk. Monogr. Serjan. 272. 1875.

Veracruz. Costa Rica.

Stems pilosulous or tomentulose; leaflets elliptic or elliptic-ovate, 4 to 10 cm. long, rounded or obtuse at apex, often abruptly short-acuminate, glabrate above, pilosulous beneath; sepals tomentulose; petals 2.5 mm. long; fruit about 2.5 cm. long and 2 cm. wide.

32. Serjania macrococca Radlk. Monogr. Serjan. 270. 1875.

Oaxaca.

Stems hirtellous, 5 or 6-sulcate; leaflets ovate or rhombic, 1 to 3 cm. long, acute or obtuse, serrate-dentate, hispid-tomentose beneath; outer sepals pilosulous, the inner tomentulose; petals 4 mm. long; fruit about 2 cm. long and broad, sparsely pilose.

33. Serjania racemosa Schumacher, Skrivt. Naturh.-Selsk. (Kjøbenhavn) 3 [2]: 127. *pl. 12, f. 3.* 1794.

Nuevo León to Michoacán, Oaxaca, and Veracruz; type from Veracruz. Central America.

Stems glabrous or pubescent, 5 or 6-sulcate; leaflets ovate to elliptic, 2 to 7 cm. long, acute or acuminate, coarsely serrate, pubescent or nearly glabrous beneath; sepals glabrous or tomentulose; petals 2.5 to 3 mm. long; fruit 1.5 to 2.3 cm. long, 1 to 2 cm. wide, glabrous or nearly so. "Nueve hojas," "contra ranilla de bestias," "cuaumecate" (Veracruz, *Urbina*); "tlatlanquaya" (Puebla, *Seler*).

34. Serjania polystachya (Turcz.) Radlk. Monogr. Serjan. 276. 1875.

Paullinia polystachya Turcz. Bull. Soc. Nat. Moscou 32 [1]: 268. 1859.

Oaxaca; type from Talea. Guatemala.

Stems tomentulose or glabrate; leaflets ovate, elliptic, or rhombic, 4 to 8 cm. long, obtuse to acuminate, thinly tomentose beneath; sepals tomentulose; petals 3.5 mm. long; fruit 2 to 2.8 cm. long, 2 cm. wide, the cells densely puberulent.

35. Serjania californica Radlk. Sitzungsb. Akad. Wiss. München 8: 222. 1878.

Known only from the type locality, Cape San Lucas, Baja California.

Stems glabrous, 6-sulcate; leaflets rhombic or ovate-rhombic, about 1 cm. long, obtuse, lobate-dentate; sepals glabrate.

The fruit is not known, and the generic position of the plant is doubtful.

36. **Serjania incisa** Torr. U. S. & Mex. Bound. Bot. 47. 1859.

Type from Santa Rosa, Coahuila. Western Texas.

Stems hirtellous or glabrate; leaflets ovate-rhombic, 1 to 3 cm. long, acute, incised-dentate, puberulent; outer sepals glabrate, the inner puberulent; petals 4 mm. long; fruit 3.5 cm. long, 2 cm. wide, subacute at apex, glabrate.

37. **Serjania sphenocarpa** Radlk. Monogr. Serjan. 269. 1875.

Known only from the original collection, this probably from Sonora.

Stems pubescent; leaflets lanceolate, 1.5 to 3 cm. long, acute, remotely incised-dentate, pubescent; sepals puberulent; fruit 1.5 cm. long, 8 to 9 mm. wide, pubescent.

38. **Serjania cystocarpa** Radlk. Ergänz. Monogr. Serjan. 136. 1886.

Serjania inflata S. Wats. Proc. Amer. Acad. **17**: 373. 1882. Not *S. inflata* Poepp. & Endl. 1844.

Coahuila, Nuevo León, and San Luis Potosí; type from Caracol Mountains, near Monclova, Coahuila.

Stems puberulent; leaflets lance-ovate to ovate-elliptic, 1 to 3.5 cm. long, obtuse or acute, crenate or incised-dentate, pilosulous; sepals puberulent; fruit pilosulous when young, becoming glabrate.

39. **Serjania pacifica** Standl., sp. nov.

Sinaloa and Tepic; type from Acaponeta, Tepic (*Rose, Standley & Russell* 14189; U. S. Nat. Herb. no. 637046).

Stems pilosulous, 5-sulcate; leaves bipinnate, the 2 lower pinnae trifoliate, the 2 upper pairs of leaflets and the terminal one simple; leaflets oblong-ovate, ovate, or oblong-oval, 2 to 6 cm. long, obtuse or acute, puberulent beneath, remotely crenate-serrate or subentire; sepals puberulent; petals 2.5 mm. long; fruit reddish, 10 to 12 mm. broad, the wings glabrous, the cells thinly hirtellous or glabrate.

2. URVILLEA H. B. K. Nov. Gen. & Sp. 5: 105. 1821.

Scandent shrubs, often with tendrils in the inflorescence and leaf axils; leaves trifoliolate or biternate, the leaflets toothed and lobed; flowers whitish, in axillary racemes, irregular, polygamo-dioecious; sepals 5, the 2 outer ones small; petals 4; stamens 8; fruit thin, 3-angled, the angles winged; seed 1 in each cell.

Leaves trifoliolate ..... 1. **U. ulmacea.**
Leaves biternate ..... 2. **U. biternata.**

1. **Urvillea ulmacea** H. B. K. Nov. Gen. & Sp. **5**: 105. *pl. 440*. 1821.

Urvillea mexicana A. Gray, Pl. Wright. **1**: 38. 1852.

Nuevo León to Yucatán, Oaxaca, and Tepic. Western Texas; Central America and northern South America; type from Caracas, Venezuela.

Large scandent shrub; leaflets ovate, rhombic-ovate, or deltoid, 3 to 7.5 cm. long, acute or acuminate, densely pubescent or tomentose beneath, crenate and often lobate; racemes long-pedunculate, longer than the leaves; fruit elliptic, 2 to 3 cm. long, narrowed at each end, pubescent or glabrate. "Apaac" (Yucatán, Maya).

2. **Urvillea biternata** Weatherby, Proc. Amer. Acad. **45**: 425. 1910.

Known only from the vicinity of the type locality, Iguala Canyon, Guerrero.

Erect (?) shrub, 1 to 2 meters high; leaflets elliptic, acuminate, nearly glabrous; racemes shorter than the leaves; fruit glabrous, 2.5 to 3 cm. long, 2 to 2.5 cm. wide.

3. CARDIOSPERMUM L. Sp. Pl. 366. 1753.

Vines, the stems herbaceous or fruticose; leaves estipulate, biternate or decompound, the leaflets coarsely toothed or lobed; flowers racemose or corymbose, axillary, the peduncle with 2 tendrils; flowers irregular, polygamodioecious, white or yellowish white; sepals 4 or 5, the 2 outer ones small; petals 4; stamens 8; fruit inflated, bladder-like, thin, 3-angled.

The species are sometimes cultivated for ornament under the name "balloon-vine."

Tendrils reduced to short spines ---------- 1. C. spinosum.
Tendrils well developed, coiling.
  Sepals 5.
    Leaflets crenate or crenate-lobate; fruit obtusely angled -- 2. C. tortuosum.
    Leaflets dissected into narrow lobes; fruit with thin compressed angles. 4. C. dissectum.
  Sepals 4 ---------- 3. C. halicacabum.

1. **Cardiospermum spinosum** Radlk. Contr. U. S. Nat. Herb. 1: 368. 1895.

Baja California; type from La Paz.

Stems fruticose; leaflets few, 5 to 15 mm. long, lobed or crenate, glabrate; petals 4 mm. long.

2. **Cardiospermum tortuosum** Benth. Bot. Voy. Sulph. 9. 1844.

Paullinia tortuosa T. S. Brandeg. Zoe 2: 74. 1891.

Baja California; type from Magdalena Bay.

Stems suffrutescent; leaflets rhombic, crenate or lobate, densely pubescent or glabrate; petals 4 to 6 mm. long; fruit 2 to 3 cm. in diameter.

3. **Cardiospermum halicacabum** L. Sp. Pl. 366. 1753.

Cardiospermum corindum L. Sp. Pl. ed. 2. 526. 1762.
Cardiospermum pubescens Lag. Gen. & Sp. Nov. 14. 1816.
Cardiospermum coluteoides H. B. K. Nov. Gen. & Sp. 5: 100. 1821.
Cardiospermum hispidum H. B. K. Nov. Gen. & Sp. 5: 101. 1821.
Cardiospermum molle H. B. K. Nov. Gen. & Sp. 5: 103. 1821.
Cardiospermum microcarpum H. B. K. Nov. Gen. & Sp. 5: 104. 1821.

Nearly throughout Mexico, at low and middle altitudes. Widely distributed in tropical regions of both hemispheres.

Stems herbaceous or suffruticose; leaflets very variable in form and pubescence, densely pubescent to glabrous, 1 to 6 cm. long; flowers 4 to 6 mm. long; fruit 1.5 to 4.5 cm. in diameter, glabrous or pubescent. "Hierba de chivato" (Tamaulipas); "huevo de gato" (Durango); "munditos" (Oaxaca).

The roots are said to have diuretic and sudorific properties. This species is an extremely variable one and many attempts have been made to segregate the forms as species, but there seem to be no definite characters by which the forms can be recognized. Radlkofer considers *C. corindum* a distinct species, but the characters by which he separates it from *C. halicacabum* are neither constant nor important. The writer is doubtful of the validity of *C. tortuosum* and *C. spinosum*.

4. **Cardiospermum dissectum** (S. Wats.) Radlk. in Engl. & Prantl, Pflanzenfam. 3^5: 308. 1895.

Urvillea dissecta S. Wats. Proc. Amer. Acad. 21: 447. 1886.

Chihuahua; type collected near the city of Chihuahua.

Stems chiefly herbaceous; leaflets small, thinly hispidulous; inflorescence few-flowered; fruit about 3 cm. broad, lustrous.

The seeds are much larger than in the other species.

4. PAULLINIA L. Sp. Pl. 365. 1753.

REFERENCE: Radlkofer, Monographie der Sapindaceengattung *Paullinia*, Abh. Akad. Wiss. München **19**: 71–381. 1896.

Scandent shrubs; leaves pinnate or ternately compound, the leaflets usually dentate or lobate; flowers polygamo-dioecious, whitish, in axillary, usually tendril-bearing racemes; sepals 5, unequal; petals 4; stamens 8; fruit capsular, 3-angled or 3-winged, 1 to 3-celled, 1 to 3-seeded.

The crushed seeds of *P. cupana* Kunth and other South American species are official in the United States Pharmacopoeia under the name "guarana." They contain about 5 per cent of an alkaloid, guaranine, which is believed to be identical with caffeine. This is used in medicine for chronic diarrhea. The Indians of Brazil prepare from the seeds a beverage, which they use like coffee. They also prepare a fermented drink from the guarana seeds, cassava, and water. In Jamaica the juice of the leaves of some species was used as a remedy for heartburn, and the bruised leaves were applied to wounds.

The crushed plants of various species of *Paullinia* and of related genera are often thrown in streams to stupefy fish. It is probably to a plant of this family that Wells refers[1] in the following account, which is quoted here as an excellent description of the procedure followed in tropical America in catching fish by the aid of narcotic plants, a very common and widely spread practice:

"A few days after my arrival at Lepaguare, I rode with Don Toribio to a place near the junction of the Almendarez and Guayape, where a *chilpate* fishing was to take place. On arriving at the river, we found a small party of natives collected on the banks of the smaller stream, engaged in spreading withes and a network of branches below a little series of falls or rapids above which the fish were known to exist in great quantities, especially the *cuyamel*, weighing often fifteen pounds when full grown.

"The preparations completed, a few women entered the river about fifty yards above the rapids, bearing with them a common *batea* containing a decoction of a vine pounded to a pulp, and known as the *chilpate* (possibly the *Sapindus saponaria*), and which may be gathered in any required quantity in the plains and along the banks of the streams. This possesses the singular quality, when mixed with the waters of a running stream, of stupefying the fish, causing them to float helplessly on the surface. When carried down the stream, they are taken by hand from the network below. The signal being given, this novel fishing apparatus was directed against the inhabitants of Almendarez.

"As the pale discoloration extended with the influence of the gentle current, my companion shouted to me to watch its effects. All eyes were riveted upon the water. In a few minutes a commotion was visible beneath the surface, and frequent flaps from the tails of sundry inebriated fish indicated the working of the drug.

"The natives now ran below the falls to catch the victims who came floating down, some with fins or tails feebly wagging above the water, others 'half-seas over,' 'regularly laid out' on their backs, and others as if under the effects of a systematic 'drunk,' struggling against the liquor, and apparently determined to keep on their fins to the last gasp. There were fish of all sizes, from the *cuyamel* down to minnows. It was the most ludicrous, and, at the same time, strange scene I had witnessed in Olancho, and seemed an unpardonable corruption of respectable fish from their original teetotal habits."

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[1] W. V. Wells, Explorations and adventures in Honduras, p. 417. 1857.

Fruit winged.
  Inflorescences glomerate in the axils; leaflets acuminate or long-acuminate. 1. **P. glomerulosa.**
  Inflorescence solitary; leaflets mostly obtuse 2. **P. fuscescens.**
Fruit not winged.
  Mesocarp of the fruit much thickened, fibrous-spongy.
    Leaflets 3 3. **P. cururu.**
    Leaflets 5 to 7.
      Stems composed of a central woody body and of 1 to 3 smaller outer ones. 4. **P. pinnata.**
      Stems of a single central woody body, without separate outer ones.
        Flowers pedicellate; leaf rachis narrowly winged 5. **P. clavigera.**
        Flowers sessile; rachis broadly winged 6. **P. sessiliflora.**
  Mesocarp of the fruit thin, not spongy-thickened.
    Capsule sessile or subsessile 7. **P. tomentosa.**
    Capsule stipitate.
      Leaves pinnate, the leaflets entire 8. **P. costata.**
      Leaves biternate, or the leaflets lobed or parted.
        Leaves biternate; leaflets mostly 3 to 8 cm. long 9. **P. costaricensis.**
        Leaves various, the lower ones merely ternate or trisect, the upper ones pinnate; leaflets mostly 1 to 2 cm. long 10. **P. sonorensis.**

1. **Paullinia glomerulosa** Radlk. Abh. Akad. Wiss. München **19**: 257. 1896.

Reported from Mexico by Radlkofer. Panama and Venezuela.

Leaves pinnate; leaflets 2 to 5 pairs, the lowest ones ternate or pinnate, mostly lanceolate, 3 to 6 cm. long, glabrate; flowers pedicellate; fruit broadly obovate, sessile, 1 cm. long, glabrate, the wings 2 to 3 mm. wide.

2. **Paullinia fuscescens** H. B. K. Nov. Gen. & Sp. **5**: 93. 1821.

Paullinia velutina DC. Prodr. **1**: 605. 1824.

Sinaloa to Tamaulipas, Yucatán, Campeche, and Oaxaca. Cuba, Central America, and northern South America; type from the Amazon River.

Leaves biternate, the leaflets rhombic or oval to lanceolate, 3 to 7 cm. long, obtusely serrate-dentate, glabrate above, tomentose to glabrate beneath; inflorescences 5 to 15 cm. long, pedunculate, densely pubescent or glabrate, the flowers white or yellowish; capsule broadly obovate, 1 to 1.5 cm. long, reddish, pubescent or glabrate. "Kexak" (Yucatán, Maya); "panoquera" (San Luis Potosí, Veracruz); "bejuco costillón" (Sinaloa); "campalaca" (Honduras); "bejuco de mulato" (Venezuela).

The tough stems are used for binding fences and the framework of huts. This species has been reported from Mexico as *P. barbadensis* Jacq.

3. **Paullinia cururu** L. Syst. Nat. ed. 10. **2**: 1007. 1759.

Reported from Mexico by Radlkofer. West Indies, Central America, and South America.

Petiole winged; leaflets elliptic or elliptic-lanceolate, 7 to 15 cm. long, obtuse to acuminate, remotely serrate-dentate, barbate beneath in the axils of the veins but elsewhere glabrous; flowers white or greenish, pedicellate; fruit pyriform or clavate, glabrous. "Azucarito" Venezuela); "chilmecate" (Nicaragua).

4. **Paullinia pinnata** L. Sp. Pl. 366. 1753.

Guerrero to Oaxaca and Tabasco. West Indies, Central America, South America, and Africa.

Large vine, nearly glabrous; leaves pinnate, the leaflets 5, ovate to oblong or lanceolate, 7 to 10 cm. long, usually acute, remotely serrate-dentate, coriaceous;

rachis broadly winged; inflorescences solitary; flowers pedicellate; fruit pyriform, glabrous, brown or red. "Barbasco" (Tabasco); "bejuquillo" (Oaxaca); "azucarito" (Cuba); "bejuco de costilla" (Porto Rico); "bejuco vaquero" (Guerrero).

Said to be known in the British West Indies as "bread-and-cheese." The plant is used in Tabasco and elsewhere for stupefying fish, and the stems are utilized as a substitute for rope. The bark has a musklike odor, and is said to contain an alkaloid, timbonine. The leaves have been applied as poultices for liver affections and the oil from the seeds as an anodyne liniment, while the plant has been used also as a remedy for gonorrhoea. Some of the Indians are said to have used the juice to poison their arrows, and it is reported that in the Antilles the negroes have made use of the seeds for criminal poisoning.

5. **Paullinia clavigera** Schlecht. Linnaea 10: 239. 1836.

Hidalgo and Veracruz; type from Hacienda de la Laguna, Veracruz. Honduras.

Large vine, nearly glabrous; leaflets 5, elliptic-lanceolate, 6 to 14 cm. long, acute or acuminate, entire or remotely serrate-dentate; inflorescences solitary; fruit pyriform, red, 3 to 4 cm. long, stipitate.

6. **Paullinia sessiliflora** Radlk. Contr. U. S. Nat. Herb. 1: 317. 1895.

Tepic and Colima; type from Colima.

Leaflets 5, oblong or ovate-oblong, 5 to 13 cm. long, obtuse or acute, remotely repand-dentate, glabrate or beneath densely pubescent; inflorescences solitary, tomentulose; fruit pyriform, about 3 cm. long, stipitate, glabrate.

7. **Paullinia tomentosa** Jacq. Enum. Pl. Carib. 37. 1760.

Paullinia pteropoda DC. Prodr. 1: 605. 1824.

Sinaloa to Tamaulipas, Veracruz, Tabasco, and Oaxaca; type from Veracruz. Guatemala.

Leaflets 5, the terminal and basal ones sometimes trilobate, ovate to broadly elliptic, 3 to 10 cm. long, obtuse or acute, thin, coarsely crenate, tomentose beneath; inflorescences solitary; capsule trigonous-globose, 1 to 1.5 cm. long, tomentose; seeds black. "Barbasquillo" (Jalisco); "barbasco" (Tabasco).

8. **Paullinia costata** Schlecht. & Cham. Linnaea 5: 216. 1830.

Veracruz, Tabasco, and Oaxaca; type from Hacienda de la Laguna, Veracruz. Costa Rica.

Leaflets 5, oblong, ovate, or oval, 6 to 15 cm. long, abruptly short-acuminate, often barbate beneath in the axils of the veins, elsewhere glabrous; racemes solitary, long-pedunculate; flowers white; fruit depressed-globose, 1 to 1.5 cm. long, tomentulose; seeds black. "Bejuco de agua" (Oaxaca).

9. **Paullinia costaricensis** Radlk. Ergänz. Monogr. Serj. 157. 1886.

Tabasco; reported from Veracruz by Radlkofer. Central America; type from Costa Rica.

Leaflets elliptic, lanceolate, or rhombic, obtuse, lobate-dentate, densely pubescent beneath or glabrate; racemes solitary, densely puberulent, 5 to 15 cm. long; capsule subglobose, about 1 cm. long, puberulent or glabrate; seeds black.

10. **Paullinia sonorensis** S. Wats. Proc. Amer. Acad. 24: 45. 1889.

Baja California and Sonora; type from Guaymas, Sonora.

Subscandent, 1 meter high or less; leaflets rhombic, ovate, or oblong-ovate, obtuse, coarsely dentate or lobate, thin, glabrate; racemes solitary, short, puberulent; capsule depressed-globose, tonentulose, about 1 cm. long.

5. ALLOPHYLUS L. Sp. Pl. 348. 1753.

Erect shrubs or trees; leaves alternate, persistent or deciduous, usually 3-foliolate, the leaflets toothed; flowers polygamo-dioecious, in simple or paniculate racemes; sepale 4; petals 4; stamens 8; ovary usually 2-celled; fruit usually of a single dry or fleshy, 1-seeded carpel.

Racemes rarely exceeding the petioles; leaflets large, 9 to 20 cm. long, thin. 1. A. occidentalis.

Racemes usually equaling or longer than the leaves; leaflets mostly 5 to 10 cm. long, thick ---------- 2. A. cominia.

1. **Allophylus occidentalis** (Swartz) Radlk. Sitzungsb. Akad. Wiss. München 20: 230. 1890.

Schmidelia occidentalis Swartz, Fl. Ind. Occ. 2: 665. 1800.

Chiapas. Central America, West Indies, and northern South America.

Shrub; leaflets elliptic or oblanceolate, acuminate, irregularly sinuate-serrate, sparsely pubescent beneath; racemes pubescent; fruit red, 6 to 8 mm. long, obovoid, nearly dry. "Palo blanco," "quiebra-hacha" (Porto Rico).

2. **Allophylus cominia** (L.) Swartz, Prodr. Veg. Ind. Occ. 62. 1788.

Rhus cominia L. Syst. Nat. Veg. ed. 10. 964. 1759.

Schmidelia cominia Swartz, Fl. Ind. Occ. 2: 697. 1800.

Tabasco. Cuba, Jamaica, and Hispaniola.

Shrub, or small tree; leaflets elliptic or obovate, serrulate, pubescent on both surfaces, densely so beneath, acute or short-acuminate; racemes branched, densely pubescent; fruit orange or red, 4 mm. long, subglobose, nearly dry.

6. UNGNADIA Endl. Atact. Bot. *pl. 36.* 1833.

A single species is known.

1. **Ungnadia speciosa** Endl. Atact. Bot. *pl. 36.* 1833.

Chihuahua, Coahuila, and Nuevo León. Texas and southern New Mexico.

Shrub or tree, sometimes 10 meters high, with a trunk 20 cm. in diameter; bark thin, light gray; leaves alternate, deciduous, pinnate; leaflets 3 to 7, lanceolate or ovate, 5 to 12 cm. long, acuminate, pubescent beneath when young but soon glabrate; flowers purplish pink, in lateral clusters; calyx deeply 5-lobed; petals 4 or 5, obovate, clawed, nearly 1 cm. long; stamens 7 to 10; fruit a 3-lobed capsule, about 5 cm. thick, 3-valvate; seeds black and lustrous, 1 to 1.5 cm. in diameter. "Monillo" or "monilla" (Chihuahua, Nuevo León, Tamaulipas).

The flowers are sweet-scented. The seeds have a pleasant flavor, but they are poisonous. Havard states that an adult can eat one or two with impunity, but three or four produce giddiness and a sensation of heat and discomfort in the stomach. The seeds are sometimes used by boys as marbles. In Texas the plant is known as "Texas buckeye," "Spanish buckeye," or "Mexican buckeye."

7. THOUINIA Poit. Ann. Mus. Hist. Nat. 3: 70. 1804.

Erect trees or shrubs; leaves 3-foliolate, the leaflets serrate; flowers small, symmetric, in lateral panicles; sepals and petals each 4; stamens 8; fruit of 2 or 3 samaras, each of these 1-seeded.

Leaflets densely pubescent beneath, usually obtuse ---------- 1. T. villosa.

Leaflets glabrous beneath, except in the axils of the veins, acute or acuminate.

Fruit glabrous or nearly so; terminal leaflet long-stalked; leaflets closely crenate-serrate ---------- 2. T. acuminata.

Fruit finely pubescent; terminal leaflet nearly sessile; leaflets with a few irregular remote teeth ---------- 3. T. paucidentata.

1. **Thouinia villosa** DC. Prodr. **1**: 612. 1824.

Thouinia pringlei S. Wats. Proc. Amer. Acad. **25**: 145. 1890.

Sonora to Guerrero and Puebla; type from Cuernavaca, Morelos.

Shrub or small tree, 3 to 5 meters high, leaflets ovate or rhombic-obovate, 3 to 9 cm long, sessile or nearly so, pubescent on both surfaces, irregularly serrate; panicles equaling or shorter than the leaves; samaras pubescent, about 1.5 cm. long.

The specimens referred here agree very well with Sessé & Mociño's drawing of the species, and the writer has little doubt that the two names cited are synonymous.

2. **Thouinia acuminata** S. Wats. Proc. Amer. Acad. **25**: 145. 1890.

Jalisco to Oaxaca; type from the barranca near Guadalajara, Jalisco. A form of the species (var. *pubicalyx* Radlk.) occurs in Guatemala.

Tree, 7.5 to 12 meters high; leaflets lanceolate or lance-elliptic, 4 to 10 cm. long, bright green; panicles about as long as the leaves; samaras 12 to 14 mm. long.

3. **Thouinia paucidentata** Radlk. Field Mus. Bot. **1**: 403. 1898.

Yucatán and Campeche.

Tree, 9 meters high; leaves long-petiolate; leaflets lanceolate or lance-elliptic, 3 to 5 cm. long; panicles racemiform, shorter than the leaves; samaras 10 to 12 mm. long.

8. DODONAEA Jacq. Enum. Pl. Carib. 19. 1760.

1. **Dodonaea viscosa** Jacq. Enum. Pl. Carib. 19. 1760.

Dodonaea schiedeana Schlecht. Linnaea **18**: 49. 1844.

Baja California to Chihuahua, Nuevo León, Mexico, and Chiapas. Widely distributed in tropical regions.

Shrub, 1 to 5 meters high; leaves linear to oblong-oblanceolate, 4 to 12 cm. long, attenuate to the base, petiolate or sessile, acute to rounded at apex, pubescent or glabrous beneath, viscid; flowers yellowish, unisexual, dioecious, in small lateral corymbs; calyx 3 to 5-lobed; petals none; stamens 5 to 8; fruit a 3-winged capsule, 3-celled, 1.5 to 2.5 cm. broad, each cell unusually 1-seeded. "Ocotillo" (Guanajuato, Hidalgo); "chapuliztoli" or "chapulizle" (Nahuatl, from *chapul-ichtli*=grasshopper+fiber; it is said that the leaves are much eaten by grasshoppers); "pirimu" (Michoacán, Tarascan); "granadina" or "grenadina" (Baja California); "jarilla" (Oaxaca, Morelos); "hierba de la cucaracha" (Durango, *Patoni*); "cuerno de cabra" (Oaxaca, *Seler*); "ayuelo" (Colombia); "chamiso" (Porto Rico, Argentina, Uruguay); "gitarán" (Porto Rico); "varal," "munditos" (Hidalgo).

The species, as is to be expected from its wide range, is a variable one, especially in leaf form. The form with linear leaves, occurring in northern Mexico, is *D. viscosa angustifolia* (L. f.) Benth. The English name is "switch-sorrel"; in the Bahamas the name "candlewood" is used. The leaves are bitter and in various regions are used for fevers, colic, gout, rheumatism, and venereal diseases. The bark is employed in the preparation of astringent baths and fomentations, and the decoction of the wood is reported to have febrifuge properties. The seeds are said to be edible. In Australia the fruits, known as "native hops," were formerly much used as a substitute for true hops (*Humulus lupulus* L.) in making yeast and beer. The wood is described as brown, close-grained, and hard, and in India it has been utilized for engraving, turning, tool handles, and walking sticks.

9. NEOPRINGLEA [1] S. Wats. Proc. Amer. Acad. 26: 134. 1891.

Shrubs or small trees; leaves alternate, petiolate, entire or crenulate; stipules setaceous, deciduous; flowers dioecious, fasciculate and racemose, greenish; staminate flowers with 4 orbicular petals; stamens 12, in 3's opposite the petals; pistillate flowers apetalous; fruit 3-winged, 1-celled, 1-seeded.

The genus has been placed by some authors in the Celastraceae and by others in the Sapindaceae. Its proper position is doubtful.

Leaves conspicuously crenate-serrate, long-acuminate, soon glabrate beneath. **1. N. viscosa.**

Leaves entire or nearly so, obtuse or acute, densely pubescent beneath. **2. N. integrifolia.**

1. **Neopringlea viscosa** (Liebm.) Rose, Contr. U. S. Nat. Herb. **12**: 282. 1909.

Llavea viscosa Liebm. Nat. For. Kjöbenhavn Vid. Medd. **1853**: 96. 1854.

Dry hillsides, Puebla and Oaxaca.

Shrub, 3 to 4.5 meters high; leaves lanceolate, ovate, or elliptic, 3 to 7 cm. long, thinly pilose when young; staminate inflorescence equaling or shorter than the leaves; pistillate flowers fasciculate; fruit about 7 mm. long, glabrous, emarginate at apex.

2. **Neopringlea integrifolia** (Hemsl.) S. Wats. Proc. Amer. Acad. **26**: 135. 1891.

Llavea integrifolia Hemsl. Diag. Pl. Mex. 6. 1878.

Coahuila to San Luis Potosí, Querétaro, and Hidalgo; type from Zimapán, Hidalgo.

Shrub or small tree, 1.5 to 6 meters high; leaves oblong or lance-oblong, 2 to 6 cm. long, pubescent on both surfaces, more densely so beneath; fruit glabrous, 7 to 9 mm. long. "Corba-gallina" (Tamaulipas, *Palmer*).

10. EXOTHEA Macfad. Fl. Jam. 1: 232. 1837.

1. **Exothea copalillo** (Schlecht.) Radlk. in Engl. & Prantl. Pflanzenfam. **3**[5]: 358. 1895.

Cyrtocarpa copalillo Schlecht. Linnaea **16**: 485. 1842.

San Luis Potosí and Veracruz.

Small tree; leaves persistent; leaflets usually 4, oblong or elliptic-oblong, 6 to 13 cm. long, obtuse, barbate beneath in the axils of the nerves, otherwise glabrous; flowers polygamous, tomentulose, in terminal and lateral panicles; sepals 5; petals 5, 3 mm. long; stamens 8. "Copalillo" (Veracruz).

Only one other species is known, *E. paniculata* (Juss.) Radlk., the inkwood, which occurs in Florida, the West Indies, and Guatemala. *E. copalillo* is closely related and may not be distinct from that species.

11. CUPANIA L. Sp. Pl. 200. 1753.

Erect shrubs or trees; leaves alternate, even-pinnate or simple; flowers polygamo-dioecious, racemose or paniculate, white or greenish; sepals 5; petals 5;

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[1] The genus is named in honor of Cyrus G. Pringle (1838–1911), a native of Vermont, perhaps the best-known and most industrious of North American botanical collectors. It has been estimated that during his 35 years of field work he distributed to the herbaria of the world over 500,000 specimens, representing 20,000 species, 12 per cent of which were new to science. His work in Mexico began in 1882 and extended nearly to the time of his death, during which period he visited repeatedly nearly all States of the Republic. The specimens he prepared are noted for their superior quality, and are unequaled, probably, by those of any other collector.

stamens 8; fruit a capsule, coriaceous or somewhat fleshy, 2 to 4-lobed; seeds arillate.

The seeds of some species are edible, and are said to have a flavor like that of chestnuts. In Guadeloupe a fermented drink has been made from them. An infusion of the leaves has been employed in the West Indies as a remedy for affections of the bladder and intestines.

Leaflets 4 or 6, or the leaves simple; capsule thin, deeply lobed. 1. C. macrophylla.

Leaflets usually about 10; capsule thick, shallowly or scarcely at all lobed. 2. C. glabra.

1. **Cupania macrophylla** A. Rich. Ess. Fl. Cuba 291. 1845.

Tamaulipas and perhaps elsewhere. Cuba (type locality); Guatemala.

Shrub or small tree; leaflets oblong, oval-oblong, or obovate-oblong, 5 to 14 cm. long, obtuse or rounded at apex, entirely or nearly so, glabrous; racemes simple or paniculate, sparsely puberulent; fruit about 1.5 cm. long. "Guara macho," "guara colorada" (Cuba); "carbón colorado" (Guatemala, *Blake*).

The Tamaulipas specimens, determined by Radlkofer, are noteworthy because nearly all their leaves are simple.

2. **Cupania glabra** Swartz, Prodr. Veg. Ind. Occ. 61. 1788.

Sinaloa to Oaxaca and Veracruz. Southern Florida, Cuba, Jamaica, Porto Rico, and Costa Rica.

Shrub or tree, sometimes 12 meters high; leaflets mostly oblong, 7 to 16 cm. long, rounded at apex, entire or crenate-serrate, glabrous or at first sparsely pubescent beneath; panicles puberulent, often equaling or exceeding the leaves; capsule brown, 12 to 15 mm. long. "Guara blanca," "guara de costa" (Cuba); "huanchal" (Oaxaca).

The wood is said to be hard, compact, heavy, and red.

DOUBTFUL SPECIES.

CUPANIA AMERICANA L. Sp. Pl. 200. 1753. This has been reported from Tabasco and Veracruz, but the writer has seen no specimens. The plant is similar to *C. glabra*, but has copiously pubescent leaves. In Tabasco it is said to be known as "chichón colorado."

CUPANIA EXCELSA H. B. K. Nov. Gen. & Sp. 5: 125. 1821. Type collected between Mazatlán and Zumpango, Guerrero.

12. MATAYBA Aubl. Pl. Guian. 1: 331. 1775.

Erect shrubs or trees; leaves alternate or opposite, persistent, pinnate; flowers in terminal and lateral panicles; calyx 5-lobate; petals 5; stamens 8; fruit a capsule, acutely or obtusely 3-angulate.

Leaflets conspicuously crenate-serrate, rounded or retuse at apex; leaves alternate ---------- 1. M. scrobiculata.

Leaflets entire or nearly so, usually narrowed at the apex; leaves mostly opposite ---------- 2. M. apetala.

1. **Matayba scrobiculata** (H. B. K.) Radlk. Sitzungsb. Akad. Wiss. München 9: 627. 1879.

Cupania scrobiculata H. B. K. Nov. Gen. & Sp. 5: 127. 1821.

Colima and Guerrero. Central America, Colombia, and Venezuela; type from Turbaco, Colombia.

Tree, about 7.5 meters high; leaflets 4 to 8, oblong or obovate-oblong, 6 to 12 cm. long, coriaceous, glabrous; panicles equaling or longer than the leaves, minutely puberulent; flowers greenish yellow, sweet-scented.

The leaves are provided beneath with small shelters (for parasites?) in the axils of the nerves.

2. **Matayba apetala** (Macfad.) Radlk. Sitzungsb. Akad. Wiss. München **9**: 535. 1879.

Cupania apetala Macfad. Fl. Jam. **1**: 162. 1837.

Veracruz. Ruatán Island; Cuba and Jamaica (type locality).

Tree, sometimes 12 meters high; leaflets 4 to 8, oblong or elliptic-oblong, 5 to 10 cm. long, usualy obtuse-acuminate, glabrous; panicles equaling or shorter than the leaves, puberulent; capsule stipitate, 1 to 1.5 cm. broad. "Doncella" (Porto Rico).

13. **THOUINIDIUM** Radlk. Sitzungsb. Akad. Wiss. München **8**: 267. 1878.

Erect shrubs or trees; leaves even-pinnate, the leaflets coriaceous, entire or serrate; flowers small, regular, in terminal panicles; sepals and petals each 5; stamens 8 or 10; fruit of 2 or 3 laterally compressed, 1-seeded samaras.

Leaflets 6 to 14, serrate, acuminate, glabrous or nearly so____1. **T. decandrum.**
Leaflets 2 or 4, entire, rounded at apex velvety-pilose beneath____2. **T. insigne.**

1. **Thouinidium decandrum** (Humb. & Bonpl.) Radlk. Sitzungsb. Akad. Wiss. München **8**: 284. 1878.

Thouinia decandra Humb. & Bonpl. Pl. Aequin. **1**: 198. *pl. 56.* 1808.

Thouinia riparia T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 186. 1915.

Sinaloa to Oaxaca; type from Acapulco, Guerrero. Guatemala to Nicaragua.

Slender tree, 4.5 to 9 meters high; bark smooth, gray; leaflets coriaceous, linear-lanceolate, 6 to 12 cm. long, often subfalcate, finely reticulate-veined; flowers white, about 3 mm. long, in large broad panicles; samaras about 4 cm. long. glabrous. "Charapo" (Michoacán, Guerrero); "panalillo" (Sinaloa).

2. **Thouinidium insigne** (T. S. Brandeg.) Standl.

Thouinia insignis T. S. Brandeg. Univ. Calif. Publ. Bot. **3**: 384. 1909.

Known only from the type locality, Santa Lucía, Puebla.

Shrub or small tree, 4 to 5 meters high; leaflets oblong, 5 to 10 cm. long, coriaceous; panicles thyrsiform, 6 to 15 cm. long; petals yellowish white, 6 mm. long; samaras about 4.5 cm. long and 2 cm. wide, the wing shorter than the body.

14. **TALISIA** Aubl. Pl. Guian. **1**: 349. 1775.

1. **Talisia olivaeformis** (H. B. K.) Radlk. Sitzungsb. Akad. Wiss. München **8**: 342. 1878.

Melicocca olivaeformis H. B. K. Nov. Gen. & Sp. **5**: 130. 1821.

Chiapas and Yucatán. Colombia; type from Turbaco.

Tree, 18 meters high; leaves persistent; leaflets 4, elliptic, 4 to 15 cm. long, acute or obtuse, glabrous; flowers paniculate, puberulent; sepals 5; petals 5; stamens 8; fruit elliptic, 1-celled, about 2 cm. long, pubescent. "Guayo" (Yucatán); "uayum" (Yucatán, Maya); "mamón de mico" (Colombia).

The fruit is edible.

15. **SAPINDUS** L. Sp. Pl. 367. 1753.

1. **Sapindus saponaria** L. Sp. Pl. 367. 1753.

Sapindus marginatus Willd. Enum. Pl. 432. 1809.

Sapindus inaequalis DC. Prodr. **1**: 608. 1824.

Sapindus drummondii Hook. & Arn. Bot. Beechey Voy. 281. 1836–39.

Sapindus amolli Sessé & Moc. Pl. Nov. Hisp. 60. 1887.

Nearly throughout Mexico; at low and middle altitudes. Widely distributed in the warmer parts of the western hemisphere.

Tree, sometimes 16 meters high, with a trunk 60 cm. in diameter, the top broad and dense; bark gray, fissured and flaky; leaves pinnate; leaflets 5 to 17, linear-lanceolate to oblong, 5 to 18 cm. long, pubescent or glabrate, obtuse to long-acuminate; flowers whitish, about 4 mm. broad, dioecious or polygamous, in large terminal panicles; sepals and petals each 5; ovary 2-celled, only one of the cells developing; fruit a 1-seeded berry, 1 to 1.5 cm. in diameter, with yellow translucent pulp; seed brown; wood light brown, dense, the specific gravity about 0.80. "Jaboncillo" (Nuevo León, San Luis Potosí, Durango, Tamaulipas, Veracruz, Nicaragua, Costa Rica, Cuba, Porto Rico); "palo blanco" (Chihuahua); "matamuchacho" (Sonora); "tehuistle," "tehoitzli," "tehuixtle," or "tehuiztle" (Nahuatl); "jamoncillo" (Durango, a corruption of *jaboncillo, Patoni*); "amole de bolita" (various localities); "yamolli," "yamole" (Nahuatl; the fruit); "palo de cuentas," "pipe," "pipal" (Oaxaca); "amole" (Chihuahua); "bibí" (Oaxaca, Zapotec, *Reko*); "cholulo," "gualulo" (Oaxaca, *Reko*); "boliche" (Sinaloa); "devanador" (Veracruz, *Seler*); "para-para" (Venezuela); "palo jabón" (Argentina).

The fruits contain as much as 37 per cent of saponin, and when macerated in water they produce suds like soap. They are much used in Mexico and other regions for washing clothes. The seeds are used for necklaces and rosaries, and they are said to have been used in England as buttons on waistcoats. The wood is of little use except for fuel. The fruit has been used as a febrifuge and for rheumatism and kidney diseases. It is said to be used also for stupefying fish. The fruits of some of the African species are edible, but their seeds are reputed poisonous. The tree is described by Oviedo (Lib. IX, Cap. V), who calls the seeds "cuentas del xabón."

Sapindus saponaria is a variable species, and some writers would divide the Mexican material into two or more species. To the present writer none of the forms appear to be of specific value. In the typical form of the species the rachis is broadly winged, but in the more common Mexican form the rachis is exalate or narrowly marginate. The latter is *S. saponaria* f. *inaequalis* (DC.) Radlk.

90. SABIACEAE. Sabia Family.

1. MELIOSMA Blume, Cat. Gew. Buitenzorg 10. 1823.

Reference: Urban, Symb. Antill. **1**: 503–518. 1900.

Trees or shrubs; leaves alternate, simple or pinnate; flowers perfect or polygamo-dioecious, in compound racemes; sepals 5, rarely 3; petals 5, the 3 outer ones broad, imbricate, the 2 inner ones narrow; stamens 3, opposite the outer petals; fruit drupaceous, the stone osseous, 1-celled, 1-seeded.

Leaves pinnate; sepals 3 ..... 1. M. alba.
Leaves simple; sepals 5.
  Flowers pedicellate; leaves mostly 10 to 15 cm. long or smaller
    Leaves serrate ..... 2. M. dentata.
    Leaves entire ..... 3. M. oaxacana.
  Flowers sessile; leaves 20 to 30 cm. long ..... 4. M. grandifolia.

1. Meliosma alba (Schlecht.) Walp. Repert. Bot. **2**: 816. 1843.

Millingtonia alba Schlecht. Linnaea **16**: 295. 1842.

Kingsboroughia alba Liebm. Nat. For. Kjöbenhavn Vid. Medd. **1850**: 67. 1851.

Known only from the vicinity of the type locality, Jalapa, Veracruz.

Leaflets 5 to 13, opposite, ovate-oblong to elliptic-lanceolate, 10 cm. long or less, petiolulate, acuminate, serrate, pubescent at first, especially beneath; flowers pedicellate; petals 1.3 to 1.7 mm. long. "Palo blanco."

2. **Meliosma dentata** (Liebm.) Urban, Bericht. Deutsch. Bot. Ges. **13**: 212. 1895.
Lorenzanea dentata Liebm. Nat. For. Kjöbenhavn Vid. Medd. **1850**: 70. 1851.
Jalisco to Oaxaca, Mexico, and Veracruz; type from Pico de Orizaba.
Tree, 7.5 to 12 meters high; leaves obovate-oblong to oblong-lanceolate, 2.5 to 6 cm. wide, acuminate, remotely spinulose-serrate, pubescent beneath at first, soon glabrate; petals 3 mm. long; fruit 9 to 10 mm. long.

3. **Meliosma oaxacana** Standl., sp. nov.
Type from Sierra San Felipe, Oaxaca, altitude 2,400 meters (*Pringle* 5720; U. S. Nat. Herb. no. 316725).
Small tree, the branchlets densely hirsutulous; petioles 5 to 8 mm. long; leaf blades narrowly lance-oblong, 4.5 to 10.5 cm. long, 1.3 to 2.5 cm. wide, acuminate, obtuse or acute at base, entire, coriaceous, puberulent above along the nerves, pale beneath, fulvous-hirsutulous along the prominent costa and nerves; panicles axillary and terminal, long-pedunculate, about equaling the leaves, brownish-hirtellous; pedicels stout, 1 to 2 mm. long; sepals 5, suborbicular, ciliate but otherwise glabrous.

4. **Meliosma grandifolia** (Liebm.) Urban, Bericht. Deutsch. Bot. Ges. **13**: 211. 1895.
Lorenzanea grandifolia Liebm. Nat. For. Kjöbenhavn Vid. Medd. **1850**: 73. 1851.
Known only from the type locality, near Cuesta de Teotalcingo, Distrito de Chinantla, Oaxaca, altitude 1,300 to 1,700 meters.
Leaves obovate-oblong, 8 to 11 cm. wide, short-acuminate, entire, pubescent, especially beneath; panicles axillary; fruit 21 to 24 mm. long, 18 to 22 mm. thick.

91. RHAMNACEAE. Buckthorn Family

Trees or shrubs, sometimes scandent, often armed with spines; leaves simple, usually stipulate, entire or toothed; flowers perfect or polygamo-dioecious, small, commonly greenish, usually in axillary cymes, calyx 4 or 5-lobate; petals 4 or 5 or none, cucullate or involute, sessile or clawed; stamens 4 or 5, opposite the petals; fruit 1 to 4-celled, capsular or drupaceous.

Plants with tendrils; ovary inferior; fruit longitudinally winged. **1. GOUANIA.**

Plants without tendrils; ovary superior; fruit not winged.
- Fruit drupaceous, with a single 1 to 4-celled stone.
  - Leaves triplinerved ..... **2. ZIZYPHUS.**
  - Leaves pinnate-nerved, or at least not triplinerved.
    - Leaves alternate or fasciculate.
      - Margins of leaves strongly revolute ..... **3. MICRORHAMNUS.**
      - Margins of leaves not revolute ..... **4. CONDALIA.**
    - Leaves subopposite ..... **5. KARWINSKIA.**
- Fruit capsular, or drupaceous but containing 2 to 4 distinct or only slightly coherent stones.
  - Leaves minute and soon deciduous; branchlets spinose, opposite. **6. ADOLPHIA.**
  - Leaves well developed, persistent; branchlets not spinose or, if so, alternate.
    - Leaves each with 2 glands on the lower side near the base of the blade. **7. CORMONEMA.**

Leaves without glands.
Cells of the fruit dehiscent; leaves usually alternate.
Petals greenish or yellowish----------8. **COLUBRINA.**
Petals white, pink, or blue----------9. **CEANOTHUS.**
Cells of the fruit indehiscent; leaves opposite or subopposite.
Flowers sessile, in large panicles----------10. **SAGERETIA.**
Flowers pedicellate, solitary or umbellate in the leaf axils.
11. **RHAMNUS.**

1. GOUANIA Jacq. Stirp. Amer. 263. 1763.

Shrubs, usually scandent, with tendrils in the inflorescence; leaves alternate, petiolate, toothed, pinnate-nerved or triplinerved; flowers small, polygamous, in long, terminal and axillary racemes or spikes; calyx 5-lobate, adherent to the ovary; petals 5; stamens 5; fruit coriaceous, inferior, 3-winged, the 3 cocci indehiscent, separating from the axis.

Stipules persistent, reniform, large, leaflike; leaves glaucescent beneath, glabrous----------1. **G. stipularis.**
Stipules deciduous, linear or subulate; leaves not glaucescent beneath, hairy, at least on the nerves.
Leaves glabrous beneath except along the nerves----------2. **G. lupuloides.**
Leaves densely pubescent beneath, between as well as upon the nerves.
Mature fruit narrowly winged, the wings about 1 mm. wide.
3. **G. mexicana.**
Mature fruit broadly winged, the wings 5 mm. wide or larger.
Axis of the fruit about 3 mm. long----------4. **G. polygama.**
Axis of the fruit 5 to 6 mm. long----------5. **G. conzattii.**

1. **Gouania stipularis** DC. Prodr. 2: 39. 1825.
Phylica scandens Sessé & Moc. Pl. Nov. Hisp. 39. 1887.
Gouania mexicana Sessé & Moc. Fl. Mex. 259. 1896. Not *G. mexicana* Rose, 1895.
Guerrero; reported from Yucatán and Oaxaca.
Branches glabrous, glaucescent; leaves slender-petiolate, oblong-elliptic or elliptic-ovate, 9 to 13 cm. long, subcordate at base, obtuse-acuminate at apex, thin, nearly entire; flowers densely pilosulous.
Sessé and Mociño give the locality of *Phylica scandens* as Apatzingan, Guerrero, and that is doubtless the type locality also of *Gouania stipularis.*

2. **Gouania lupuloides** (L.) Urban, Symb. Antill. 4: 378. 1910.
Banisteria lupuloides L. Sp. Pl. 427. 1753.
Rhamnus domingensis Jacq. Enum. Pl. Carib. 17. 1760.
Gouania domingensis L. Sp. Pl. ed. 2. 1663. 1763.
Chihuahua to Tamaulipas, Veracruz, Yucatán, Chiapas, and Sinaloa. Southern Florida, West Indies, and Central America.
Stems 3 to 10 meters long, glabrous or nearly so; leaves short-petiolate. lance-oblong to broadly ovate-elliptic, 4.5 to 11 cm. long, acute or acuminate, rounded or subcordate at base, remotely and coarsely serrate or subentire; racemes 10 to 40 cm. long; flowers white or greenish white, densely pubescent; fruit 7 to 12 cm. broad, glabrous or nearly so. "Xomak" (Yucatán, Maya); "bejuco leñatero," "jaboncillo bejuco" (Cuba); "rabo de mono" (Nicaragua); "bejuco de indio" (Santo Domingo).
In the British West Indies the plant is known as "chewstick," pieces of the stem being sometimes chewed to heal and harden the gums and to cleanse the teeth. A decoction of the plant also is employed to harden the gums, and the

dried and powdered stems are employed in making dentifrices, having been exported to Europe for this purpose. The stems are bitter, and they were formerly used in Jamaica as a substitute for hops in brewing beer. The leaves have been employed for dropsy and affections of the stomach. The flowers are much frequented by bees.

3. **Gouania mexicana** Rose, Contr. U. S. Nat. Herb. **3**: 314. 1895.

Sonora and Sinaloa; type from Culiacán, Sinaloa.

Slender scandent shrub with tomentulose branchlets; leaves slender-petiolate, ovate-oblong to oblong-elliptic or broadly ovate, 6 to 9 cm. long, acute, rounded or subcordate at base, densely pubescent on both surfaces, irregularly serrate; fruit 4 to 6 mm. broad, densely tomentose.

4. **Gouania polygama** (Jacq.) Urban, Symb. Antill. **4**: 378. 1910.

Rhamnus polygama Jacq. Enum. Pl. Carib. 17. 1760.

Gouania tomentosa Jacq. Stirp. Amer. 263. 1763.

San Luis Potosí, Veracruz, Oaxaca, and Chiapas. West Indies, Central America, and northern South America.

Stems densely tomentulose; leaves elliptic, broadly ovate, or ovate-elliptic, 5.5 to 11 cm. long, obtuse and abruptly short-acuminate, usually subcordate at base, coarsely crenate or serrate, thinly or densely tomentose beneath; fruit 10 to 12 mm. broad, tomentose or in age glabrate. "Jaboncillo" (Panama).

The bark is said to contain saponin.

5. **Gouania conzattii** Greenm. Field Mus. Bot. **2**: 257. 1907.

Guerrero to Oaxaca and Puebla; type from Cerro de San Felipe, Oaxaca, altitude 1,700 meters.

Stems tomentulose or glabrate; leaves short-petiolate, ovate-elliptic, 5 to 9 cm. long, acute or short-acuminate, subcordate at base, thinly tomentulose beneath, irregularly crenate; fruit 8 to 13 mm. wide, glabrate. "Espumilla" (Guatemala); "enredadera" (Oaxaca, *Conzatti*).

Perhaps only a form of *G. polygama*.

2. ZIZYPHUS Adans. Fam. Pl. 2: 304. 1763.

Trees or shrubs; stipules often developing into spines; leaves alternate or opposite, 3-nerved, deciduous; flowers in axillary cymes; calyx 5-lobate; petals 5, cucullate; stamens 5; fruit drupaceous, the stone 1 to 3-celled.

Zizyphus sativa Gaertn. is cultivated in southern Europe for its edible fruit. *Z. jujuba* Lam., the jujube, also is cultivated for its fruit, from which is obtained the jujube paste used in confectionery.

Leaves cuspidate-acuminate ..... **4. Z. acuminata.**
Leaves rounded or very obtuse at apex.
  Inflorescence pubescent; leaf blades cordate or rounded at base; branches green ..... **1. Z. sonorensis.**
  Inflorescence glabrous; leaf blades often cuneate at base; branches brown.
    Leaves 3 to 7 cm. long ..... **2. Z. mexicana.**
    Leaves 1 to 3 cm. long ..... **3. Z. pedunculata.**

1. **Zizyphus sonorensis** S. Wats. Proc. Amer. Acad. **24**: 44. 1889.

Zizyphus seleri Loesener, Verh. Bot. Ver. Brand. **51**: 29. 1909.

Zizyphus endlichii Loesener, Repert. Sp. Nov. Fedde **8**: 296. 1910.

Baja California and Sonora to Jalisco and Oaxaca; type from Guaymas, Sonora.

Shrub or small tree, 2 to 12 meters high, the younger branches green and often geniculate, armed with long stout spines; trunk bark grayish; leaves

ovate to orbicular-ovate, 3 to 5 cm. long, rounded or obtuse at apex, entire or remotely crenate, densely pubescent or nearly glabrous; cymes long-pedunculate, equaling or longer than the leaves; fruit globose, red, about 1 cm. in diameter. "Nanche de la costa" (Sinaloa); "amole dulce" (Oaxaca).

The fruit of this and the next species is used as a substitute for soap in washing clothes.

2. **Zizyphus mexicana** Rose, Contr. U. S. Nat. Herb. 1: 315 1895.

Colima to Oaxaca; type from Armeria, Colima.

Tree, 4.5 to 7.5 meters high, glabrous throughout; leaves mostly oblong, 3 to 7 cm. long, entire or crenate, reticulate-veined; cymes umbelliform, few-flowered, shorter than the leaves; fruit 12 to 15 mm. in diameter, globose. "Amole" (Colima).

3. **Zizyphus pedunculata** (T. S. Brandeg.) Standl.

Condalia pedunculata T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 384. 1909.

Type from Barranca de Tlacuilosto, San Luis Tultitlanapa, Puebla.

Spiny shrub with brown branches; leaves mostly opposite, short-petiolate, oblong to oval, bright green, rounded at apex, entire or nearly so, glabrate; inflorescence few-flowered; flowers about 5 mm. broad.

Condalia seleri Loesener,[1] described from Tecomavaca, Oaxaca, is apparently a synonym, and it may be that both names refer only to a small-leaved form of *Z. mexicana.*

4. **Zizyphus acuminata** Benth. Bot. Voy. Sulph. 78. 1844.

Type from Acapulco, Guerrero. Costa Rica.

Branches armed with short stout spines, brown; leaves elliptic or oblong-elliptic, 10 to 13 cm. long, serrate above, glabrous.

3. MICRORHAMNUS A. Gray, Pl. Wright. 1: 34. 1852.

1. **Microrhamnus ericoides** A. Gray, Pl. Wright, 1: 34. 1852.

Chihuahua, Coahuila, and Zacatecas. Western Texas; type from valley of Pecos River.

Densely branched shrub, 0.5 to 1.5 meters high, glabrous, the branchlets spinose; leaves alternate and fasciculate, linear or oblong, 3 to 6 mm. long, persistent, the margins strongly revolute; flowers yellow, pedicellate; calyx 5-lobate; petals 5, cucullate, clawed; fruit an ovoid drupe, 5 to 7 mm. long, 1-celled. "Abrojo" (Durango); "tecomblate" (Durango, Chihuahua).

4. CONDALIA[2] Cav. Anal. Cienc. Nat. 1: 39. 1799.

Shrubs or small trees, the branches usually spinose; leaves alternate, pinnate-nerved, coriaceous, deciduous; flowers axillary, solitary or fasciculate; calyx 5-lobate; petals 5 or none; stamens 5; fruit drupaceous, the stone 1-celled.

Petals none.
- Leaves 5 to 15 mm. wide ..... 1. C. obovata.
- Leaves less than 5 mm. wide.
  - Lateral nerves of the leaves very conspicuous beneath, broad and coarse. 2. C. spathulata.
  - Lateral nerves slender and inconspicuous ..... 3. C. mexicana.

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[1] Repert. Sp. Nov. Fedde 9: 355. 1911.

[2] In honor of Antonio Condal, a native of Barcelona, who accompanied the scientific expedition, under the direction of the Swedish botanist, Peter Loefling, sent by the Spanish Government to explore its South American possessions.

Petals present.
  Inflorescence a sessile umbel, or the flowers solitary; fruit short-beaked.
    Pedicels glabrous; leaves pale beneath ..... 4. **C. parryi.**
    Pedicels pubescent; leaves green beneath ..... 5. **C. lloydii.**
  Inflorescence a short-pedunculate umbel; fruit not beaked.
    Leaves green beneath, somewhat 3-nerved at base ..... 6. **C. obtusifolia.**
    Leaves pale beneath, pinnate-nerved ..... 7. **C. lycioides.**

1. **Condalia obovata** Hook. Icon. Pl. *pl. 287.* 1840.

Nuevo León and Tamaulipas. Western Texas.

Shrub or small tree, sometimes 10 meters high, with a trunk 20 cm. in diameter; bark thin, brown, ridged; leaves broadly spatulate, 1 to 2.5 cm. long, rounded at apex, petiolate, entire, glabrate; flowers green, solitary or fasciculate, nearly sessile; fruit dark blue or nearly black, 6 mm. long, with sweet flesh; wood hard and dense, red, its specific gravity about 1.20. "Brasil" (Tamaulipas, Texas); "capulín" (Nuevo León); "capul negro" (Texas).

The wood yields a blue dye. The fruit, like that of other species, is edible and is said to make good jelly.

The writer has seen no material of *C. obovata angustifolia* Loesener,[1] described from Sinaloa, where it is said to be known as "mezquitillo." It probably should be referred to some other species.

2. **Condalia spathulata** A. Gray, Pl. Wright. **1**: 32. 1852.

Baja California to Sonora, Sinaloa, Zacatecas, Tamaulipas, and Coahuila. Western Texas to southern California; type collected in Texas on the Rio Grande.

Densely branched shrub, 1 to 2 meters high, with slender spinose branchlets; leaves narrowly spatulate, 5 to 10 mm. long, obtuse, petiolate, glabrous or pubescent; flowers pedicellate, solitary or fasciculate; fruit short-beaked, 4 to 5 mm. long, black or purplish, bitter. "Chamís" (Zacatecas); "abrojo," "tecomblate" (Durango).

3. **Condalia mexicana** Schlecht. Linnaea **15**: 471. 1841.

Chihuahua and Coahuila to San Luis Potosí, Querétaro, Hidalgo, and Puebla; type from Zimapán, Hidalgo. Southern Arizona.

Shrub, 1 to 2 meters high, with stout spinose branches; leaves obovate or oblanceolate, 5 to 12 mm. long, rounded at apex, short-petiolate, entire, pubescent or glabrate; flowers nearly sessile in the axils; fruit 4 to 6 mm. long, short-beaked. "Bindó" (San Luis Potosí, *Ramírez*).

4. **Condalia parryi** (Torr.) Weberb. in Engl. & Prantl, Pflanzenfam. **3**[5]: 404. 1895.

Zizyphus parryi Torr. U. S. & Mex. Bound. Bot. 46. 1859.

Baja California. Southern California; type from San Felipe.

Densely branched shrub, 0.5 to 4.5 meters high, densely armed with stout spines, glabrous throughout; leaves obovate or elliptic, 8 to 15 mm. long, short-petiolate, rounded at apex, entire; pedicels 4 to 6 mm. long; fruit ovoid, 1 to 1.5 cm. long, yellowish red.

The Coahuilla Indians of southern California pounded the fruit into a coarse meal which was mixed with water to make atole.

5. **Condalia lloydii** Standl., sp. nov.

Type from foothills, Cedros, Zacatecas (*Lloyd* 71; U. S. Nat. Herb. no. 574037).

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[1] Repert. Sp. Nov. Fedde **8**: 297. 1910.

Shrub with stout spinose branchlets; leaves fasciculate, short-petiolate, the blades oblong or elliptic, 6 to 12 mm. long, rounded at base and apex, entire or nearly so, bright green and pubescent on both surfaces; flowers fasciculate, the slender pedicels 3 to 4 mm. long; calyx pubescent, the lobes deltoid; petals equaling the calyx lobes. "Garrapata."

6. **Condalia obtusifolia** (Hook.) Weberb. in Engl. & Prantl, Pflanzenfam. 3^5: 404. 1895.

Rhamnus obtusifolia Hook.; Torr. & Gray, Fl. N. Amer. **1**: 685. 1840.

Zizyphus obtusifolia A. Gray, Gen. Fl. Amer. **2**: 170. 1849.

Tamaulipas. Western Texas.

Densely branched shrub with stout spinose branchlets, these covered with pruinose flaky epidermis; leaves short-petiolate, ovate or elliptic, 6 to 20 mm. long, obtuse or acute, thin, glabrate, entire or serrate; inflorescence villosulous; fruit subglobose, black, 8 mm. in diameter. "Abrojo," "chaparro prieto" (Tamaulipas).

The fruit is edible but of poor quality. The roots are employed in Tamaulipas as a substitute for soap, and a decoction of them is applied to sores on horses.

7. **Condalia lycioides** (A. Gray) Weberb. in Engl. & Prantl, Pflanzenfam. 3^5: 404. 1895.

Zizyphus lycioides A. Gray, Bost. Journ. Nat. Hist. **6**: 168. 1850.

Baja California to Chihuahua, Nuevo León, San Luis Potosí, and Zacatecas; type collected between Matamoros, Coahuila, and Mapimí, Durango. Western Texas to southern California.

Densely branched shrub, 1 to 2.5 meters high, the branchlets spinose, whitish; leaves oblong, oval, or ovate, 5 to 25 mm. long, obtuse or rounded at apex, entire or serrate, thin, pubescent or glabrate; fruit 6 to 8 mm. long, black. "Clepe" (Tamaulipas); "crucillo" (Tamaulipas, Coahuila); "garrapata" (Zacatecas); "barchatas" (Sonora); "garambullo" (Durango, *Patoni*).

The typical form is glabrate. *C. lycioides canescens* (A. Gray) Trel.[1] is a form with pubescent leaves. *C lycioides microphylla* Loesener,[2] described from Coahuila, is a form with small narrow leaves. The fruit is edible. The root bark is used as a soap substitute. The Pimas of Arizona employed a decoction of the root as a remedy for sore eyes.

5. **KARWINSKIA**[3] Zucc. Abh. Akad. Wiss. München **2**: 349. 1832.

Shrubs or small trees; leaves subopposite, sessile or petiolate, entire, pinnate-nerved, pellucid-punctulate; flowers axillary, solitary or in cymes or umbels; calyx 5-lobate, the lobes acute; petals 5, cucullate; stamens 5; fruit drupaceous, apiculate, the stone 1 or 2-celled.

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[1] In A. Gray, Syn. Fl. 1^1: 403. 1897. *Zizyphus lycioides canescens* A. Gray; Rothr. in Wheeler, Rep. U. S. Surv. 100th Merid. **6**: 82. 1879.

[2] Repert. Sp. Nov. Fedde **8**: 296. 1910.

[3] The genus was named for Wilhelm Friedrich von Karwinski, a Bavarian, who spent many years in Brazil. In 1826 he was sent by a society at Düsseldorf to Mexico to collect objects of natural history. He remained five years in Mexico, most of the time in Oaxaca, although he collected also in Hidalgo and probably in Mexico. He forwarded to Europe many living plants, especially Cactaceae and Agaves. In 1840 he revisited Mexico on behalf of the Russian Government and obtained collections which were sent to St. Petersburg. He died at Munich in 1855.

Leaves sessile, cordate at base ..... **1. K. umbellata.**
Leaves petiolate, rounded or obtuse at base.
Flowers densely pubescent; leaves pubescent beneath.
Nerves impressed on the upper surface of the leaf; leaves finely and densely puberulent above ..... **2. K. mollis.**
Nerves not impressed; leaves glabrate above ..... **3. K. pubescens.**
Flowers glabrous; leaves glabrous beneath.
Petioles 1 to 3 cm. long; leaves mostly 3 to 5.5 cm. wide, usually rounded and mucronate at apex ..... **4. K. latifolia.**
Petioles less than 1 cm. long, usually less than 7 mm.; leaves mostly 1 to 2 cm. (rarely 3 cm.) wide, not conspicuously mucronate. **5. K. humboldtiana.**

1. Karwinskia umbellata (Cav.) Schlecht. Linnaea **15**: 460. 1841.
Rhamnus umbellata Cav. Icon. Pl. **6**: 2. *pl. 504.* 1801.
Karwinskia sessilifolia Schlecht. Linnaea **15**: 461. 1841.
Michoacán and Guerrero; type collected between Chilpancingo and Río Azul, Guerrero.
Glabrous shrub or small tree, 1 to 4.5 meters high; leaves elliptic-ovate, 4 to 8 cm. long, obtuse or rounded at apex, the transverse veins very prominent beneath; umbels pedunculate, few-flowered; flowers green; fruit 7 to 8 mm. in diameter.

2. Karwinskia mollis Schlecht. Linnaea **15**: 461. 1841.
Querétaro, San Luis Potosí, and Veracruz; type from Barranca de Santa María.
Shrub; branches densely pilosulous; leaves short-petiolate, oblong to elliptic, 1.5 to 4.5 cm. long, obtuse or rounded at apex, finely and densely pubescent on both surfaces, the lateral nerves close and parallel, very prominent beneath; umbels usually sessile, often reduced to a single flower; fruit 7 to 9 mm. in diameter.

3. Karwinskia pubescens Standl., sp. nov.
Baja California and Sonora to Oaxaca, and Coahuila; type from Hermosillo, Sonora (*Maltby* 215; U. S. Nat. Herb. no. 314960). Western Texas.
Slender shrub, about 1 meter high, the branchlets puberulent; leaves short-petiolate, oblong to ovate or elliptic, 2 to 4.5 cm. long, obtuse or rounded at base and apex, thin, beneath puberulent or thinly pilosulous, glabrate above, the lateral nerves usually few and distant; umbels sessile or short-pedunculate, densely pubescent; fruit 5 to 7 mm. in diameter. "Coyotillo" (Texas).
This may be only a form of *K. humboldtiana*, but it appears fairly distinct.

4. Karwinskia latifolia Standl., sp. nov.
Sinaloa, Tepic, and Jalisco; type from Tepic (*Palmer* 1848; U. S. Nat. Herb. no. 305562).
Shrub or small tree, sometimes 6 meters high, glabrous throughout; leaves lance-oblong to broadly ovate-elliptic, 6 to 11 cm. long, rounded or obtuse at base, usually rounded at apex and mucronate, thin, pale beneath, the lateral nerves comparatively few and distant; umbels pedunculate; fruit 7 to 10 mm. long. "Margarita" (Jalisco).
This is the plant reported by Hooker and Arnott[1] as *Rhamnus biniflorus* var. ?, and referred doubtfully by Schlechtendal[2] to *K. affinis*. The leaves in some specimens are strikingly suggestive of those of certain species of *Cornus*.

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[1] Bot. Beechey Voy. 283. 1836–39.
[2] Linnaea **15**: 460. 1841.

5. **Karwinskia humboldtiana** (Roem. & Schult.) Zucc. Abh. Akad. Wiss. München **2**: 351. 1832.

Rhamnus humboldtiana Roem. & Schult. Syst. Veg. **5**: 295. 1819.

? *Rhamnus biniflorus* DC. Prodr. **2**: 26. 1825.

Karwinskia glandulosa Zucc. Flora **7**[2]: Beibl. 71. 1832.

Karwinskia affinis Schlecht. Linnaea **15**: 460. 1841.

? *Karwinskia biniflora* Schlecht. Linnaea **15**: 460. 1841.

? *Karwinskia subcordata* Schlecht. Linnaea **15**: 462. 1841.

Rhamnus maculata Sessé & Moc. Pl. Nov. Hisp. 38. 1887.

Karwinskia parvifolia Rose, Contr. U. S. Nat. Herb. **1**: 315. 1895.

Baja California to Tamaulipas, Veracruz, Yucatán, and Oaxaca; type collected near Puente de la Madre de Dios, between Totonilco El Grande and Actopan, Veracruz. Western Texas.

Shrub or small tree, 1 to 8 meters high, the trunk sometimes 20 cm. in diameter; leaves oblong to oval or elliptic, 1 to 6.5 cm. long, rounded to acute at apex, paler beneath, with few or numerous pairs of nerves; umbels short-pedunculate, or some of them sessile; fruit 6 to 9 mm. long, blackish. "Coyotillo" (Tamaulipas, Texas); "tullidora" (Nuevo León, Querétaro); "tullidor" (Coahuila, Tamaulipas); "capulincillo" (Nuevo León, Querétaro, Oaxaca); "capulincillo cimarrón" (Valley of Mexico, Querétaro); "capulín" (Coahuila, Tamaulipas); "palo negrito" (Sinaloa); "margarita" (Tepic, Jalisco, Colima, Sinaloa, Durango); "cacachila china," "cacachila silvestre," "frutillo," "negrito" (Sinaloa); "cacachila" (Chihuahua); "cachila" (Baja California); "margarita del cerro" (Jalisco); "tlalcapolin" (Nahuatl).

The wood is said to be hard and strong. The fruit is sweet and edible, but the stones are harmful if swallowed. In people, especially children, paralysis, particularly of the lower limbs, is caused by eating stones, and similar effects are said to be produced in pigs and chickens. Palmer states that in Tamaulipas children thus paralyzed are taken to a slaughter pen, and stomachs of freshly killed cattle are wrapped about the parts affected, an outer covering being employed to retain the warmth. There is a prevalent belief that this mode of treatment is quite successful. The seeds are oily, and they contain some principle which paralyzes the motor nerves. They are employed in Mexico as an anticonvulsive, particularly in the case of tetanus. An infusion or decoction of the leaves and roots is used locally for fevers, and Palmer states that the hot tea is held in the mouth as a remedy for toothache and neuralgia.[1]

This plant is illustrated by Hernández[2] and described in a chapter entitled "De Cacatzin, seu parva Cacatl," but little information is given concerning it. Clavigero (Historia de la California, 1789) also gives an account of the plant and of its harmful properties.

The only Yucatán specimen seen by the writer is noteworthy in having sparsely pubescent flowers. The species is somewhat variable, but none of the forms appear worthy of specific rank. *K. parvifolia*, a form of the Pacific coast, has very small leaves, but the leaves vary too greatly in size throughout the range of the plant to permit the use of this as a specific character.

6. ADOLPHIA Meisn. Pl. Vas. Gen. 70. 1837.

1. **Adolphia infesta** (H. B. K.) Meisn. Pl. Vas. Gen. 70. 1837.

Ceanothus infestus H. B. K. Nov. Gen. & Sp. **7**: 61. *pl. 614*. 1825.

Colletia multiflora DC. Prodr. **2**: 29. 1825.

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[1] See also S. E. Sosa, Tullidora ó capulincillo, Estudio **2**: 35.

[2] Thesaurus 308. 1651.

Baja California to Chihuahua, Zacatecas, Hidalgo, and Oaxaca; type from "Gasave." Western Texas.

Shrub, 1.5 to 2.5 meters high, densely branched, the branches green, spinose, glabrous or pubescent; stipules persistent; flowers small, fasciculate in the axils; calyx 5-lobate; petals 5, spatulate, cucullate; fruit drupaceous, coriaceous, 3-celled. "Junco" (Durango).

Adolphia californica S. Wats.[1] has been reported from Mexico and may occur in northern Baja California. It is not certain that it is specifically distinct from *A. infesta.*

7. CORMONEMA Reissek; Endl. Gen. Pl. 1098. 1840.

Shrubs or small trees, armed with spines; leaves alternate, entire, petiolate, the blade with 2 glands on the under surface near the base; flowers axillary, solitary or fasciculate, pedicellate; calyx 5-lobate; petals 5, cucullate, clawed; stamens 5; fruit drupaceous, 3-celled, the cocci crustaceous.

Leaves acuminate at apex, acute at base.....1. C. mexicana.
Leaves rounded or vary obtuse at apex and usually retuse, rounded or obtuse at base.....2. C. biglandulosa.

1. Cormonema mexicana Rose, Contr. U. S. Nat. Herb. 3: 315. 1895.

Known only from Tepic, the type locality.

Tree, 3.5 meters high, the trunk 12 cm. in diameter; leaves oblanceolate or oblanceolate-elliptic, 7 to 15 cm. long, nearly glabrous, the glands borne at the base of the blade adjacent to the petiole; fruit about 1 cm. in diameter.

2. Cormonema biglandulosa (Sessé & Moc.) Standl.

Rhamnus biglandulosa Sessé & Moc. Pl. Nov. Hisp. 38. 1887.

Cormonema nelsoni Rose, Contr. U. S. Nat. Herb. 3: 315. 1895.

Sinaloa to Guerrero; type from Apatzingan, Guerrero.

Shrub or tree, 2 to 7 meters high; leaves suborbicular to elliptic, 3 to 7.5 cm. long, glabrous or nearly so, the glands borne on the margin of the blade remote from the petiole; flowers greenish yellow, densely glomerate, pubescent; fruit 6 mm. in diameter. "Alezuilla" (Sinaloa).

8. COLUBRINA L. Rich.; Brongn. Ann. Sci. Nat. 10: 368. 1827.

Shrubs or trees, unarmed; leaves alternate, petiolate, entire or serrate, usually 3-nerved; flowers axillary, cymose or fasciculate, greenish; calyx 5-lobate; petals 5, cucullate, clawed; stamens 5; fruit drupaceous, 3-coccous, the cocci membranaceous or crustaceous.

The bark of some the West Indian species is reported to be bitter and to have antiscorbutic, stomachic, tonic, laxative, febrifuge, and vermifuge properties.

Leaves entire, pinnate-nerved, all or most of them less than 2 cm. long. 1. C. glabra.
Leaves finely or coarsely serrate, 3-nerved at base, usually more than 2 cm. long.
  Leaves coarsely, irregularly, and remotely serrate, the lower surface sometimes glabrous or glabrate.
    Lower surface of leaves brown or ferruginous-tomentose..2. C. ehrenbergii.
    Lower surface of leaves glabrous or glabrate.....3. C. glomerata.
  Leaves finely, evenly, and closely serrulate, the lower surface tomentose or densely pubescent.

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[1] Proc. Amer. Acad. 11: 126. 18776.

Leaves rounded or very obtuse at apex, rarely acute, the fruit then more than 1 cm. in diameter.

Leaves 4 to 10 mm. wide, pilose beneath or in age glabrate; fruit about 8 mm. in diameter ..... **4. C. texensis.**

Leaves 1.5 to 7 cm. wide, tomentose beneath; fruit over 1 cm. in diameter. **5. C. macrocarpa.**

Leaves acute or acuminate; fruit 8 mm. or less in diameter.

Leaves glabrous on the upper surface, in age glabrate beneath. **6. C. celtidifolia.**

Leaves pubescent on the upper surface, densely tomentose or loosely sericeous beneath ..... **7. C. greggii.**

1. **Colubrina glabra** S. Wats. Proc. Amer. Acad. **24**: 44. 1889.

Baja California and Sonora; type from Guaymas, Sonora.

Densely branched shrub, 1.5 to 3.5 meters high; leaves mostly fasciculate, orbicular to oblong-ovate, obovate, or elliptic, rounded or retuse at apex, glabrous or pubescent; flowers yellowish green; fruit 4 to 6 mm. broad.

2. **Colubrina ehrenbergii** Schlecht. Linnaea **15**: 469. 1841.

Jalisco, San Luis Potosí, and Veracruz; type collected between Ajuntas and Las Verdosas.

Shrub or small tree; leaves short-petiolate, oblong-ovate to broadly ovate, 4 to 8 cm. long, acutish, coriaceous, glabrous or nearly so on the upper surface; fruit 5 to 6 mm. in diameter.

3. **Colubrina glomerata** (Benth.) Hemsl. Biol. Centr. Amer. Bot. **1**: 200. 1880.

Rhamnus glomerata Benth. Pl. Hartw. 9. 1839.

?*Zizyphus acuminata* Benth. Bot. Voy Sulph. 78. 1844.

Barcena guanajuatensis Duges, Rev. Cienc. Mex. **1**: 8. 1879.

Colubrina arborea T. S. Brandeg. Zoe **4**: 401. 1894.

Colubrina mexicana Rose, Contr. U. S. Nat. Herb. **3**: 315. 1895.

Baja California to Chihuahua, Guanajuato, Puebla, and Oaxaca; type from Zacatecas.

Shrub or small tree, 2 to 6 meters high; leaves lanceolate to broadly ovate, 5 to 12 cm. long, acute to long-acuminate, obtuse or rounded at base, bright green; fruit 6 to 8 mm. in diameter.

The species is somewhat variable in leaf form, but the leaves vary about as much upon a single plant as in the whole series of specimens.

4. **Colubrina texensis** (Torr. & Gray) A. Gray, Bost. Journ. Nat. Hist. **6**: 169. 1850.

Rhamnus texensis Torr. & Gray, Fl. N. Amer. **1**: 263, 1838.

Coahuila and Nuevo León. Texas.

Shrub, 1 to 2 meters high, densely branched; leaves short-petiolate, elliptic or obovate, acute to rounded at base.

5. **Colubrina macrocarpa** (Cav.) Don, Hist. Dichl. Pl. **2**: 36. 1832.

Ceanothus macrocarpus Cav. Icon. Pl. **3**: 38. *pl. 276*. 1794.

Colubrina megacarpa Rose, Contr. U. S. Nat. Herb. **8**: 50. *pl. 11*. 1903.

Colubrina lanulosa Blake, Contr. Gray Herb. **52**: 74. 1917.

Michoacán, Guerrero, Querétaro, and Puebla.

Shrub or small tree, 2.5 to 4 meters high; leaves elliptic-oblong to rounded-ovate, 3 to 8 cm. long, rounded or rarely acutish at apex, rounded or cordate at base, densely pubescent on the upper surface. "Café cimarrón" (Querétaro).

Colubrina alamani DC.,[1] described from Mexico, is probably the same species, but it may be the same as *C. greggii.*

6. **Colubrina celtidifolia** (Schlecht. & Cham.) Schlecht. Linnaea **15**: 471. 1841.
Ceanothus celtidifolius Schlecht. & Cham. Linnaea **5**: 602. 1830.
Veracruz; type from Jalapa. Guatemala.
Leaves ovate or broadly elliptic-ovate, 7 to 11 cm. long, rounded or subcordate at base, bright green.

7. **Colubrina greggii** S. Wats. Proc. Amer. Acad. **17**: 336. 1882.
Coahuila and Nuevo León to Veracruz and Yucatán; type from Monterrey, Nuevo León.
Shrub or small tree; leaves on long or short petioles, oblong-ovate to broadly ovate, 4 to 12 cm. long, obtuse to cordate at base. "Manzanita," "guayul" (Tamaulipas); "pimiento-ché," "yax-pukim," "yax-puken" (Yucatán, Maya).
This has been reported from Yucatán as *C. ferruginosa* Brongn., a West Indian species. The fruit is said to be edible. Palmer reports that in Tamaulipas the wood is used for shoe pegs.

9. CEANOTHUS L. Sp. Pl. 195. 1753.

Shrubs or small trees, often with spinose branchlets; leaves alternate or opposite, short-petiolate, entire or toothed, usually triplinerved; flowers perfect, in cymes or umbels, these usually forming panicles or thyrses; petals white, pink, or blue; calyx 5-lobate; petals 5; stamens 5; fruit dry, 3-coccous, longitudinally dehiscent.

Some of the species are showy when in flower. The blue-flowered ones are known on the Pacific coast of the United States as "California lilac." *Ceanothus americanus* L., of the United States is known as "New Jersey tea." The astringent roots contain over 6 per cent of tannin, and an alkaloid, ceanothine. They have been used in the treatment of syphilis, and are said to have purgative properties. The leaves were used by the Indians to make a beverage like tea, and during the Revolutionary War they were employed along the Atlantic coast as a substitute for Chinese tea. Gilmore[2] states that the flavor of the beverage made from them "is something like that of Asiatic tea and is much better than that of the South American yerba maté." The fresh flowers of some, and probably of all, of the species, when rubbed in water, gives a cleansing lather which is a good substitute for soap.

Stipules persistent, the bases corky or spongy; leaves opposite, except in one species; capsule usually with dorsal and apical horns as well as crests; flowers white, umbellate.
- Leaves alternate ---------- **1. C. verrucosus.**
- Leaves opposite.
  - Leaves coarsely dentate ---------- **2. C. goldmanii.**
  - Leaves entire, or rarely with 1 or 2 teeth.
    - Leaves cuneate-obovate or spatulate, the margins not revolute. **3. C. cuneatus.**
    - Leaves oblong to oval, the margins revolute.
      - Tomentum of the lower surface of the leaf coarse and loose. **4. C. lanuginosus.**
      - Tomentum very fine and closely appressed ---------- **5. C. greggii.**

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[1] Prodr. 2: :31. 1825.
[2] Ann. Rep. Bur. Amer. Ethnol. **33**: 102. 1919.

Stipules thin and deciduous; leaves alternate; capsule without horns; flowers blue or white, usually racemose.
Leaves glabrous beneath or with a few closely appressed, straight hairs; branchlets glaucous or glaucescent.
Leaves pinnate-nerved.....6. C. spinosus.
Leaves 3-nerved.....7. C. divaricatus.
Leaves copiously pubescent beneath, usually densely so, often tomentose; branchlets never glaucous.
Branchlets never spinose; petals usually blue; flowers mostly in elongate racemes.
Leaves 1 to 2 cm. long, densely and minutely sericeous beneath. 8. C. tomentosus.
Leaves mostly 3 to 8 cm. long, coarsely tomentose beneath. 9. C. coeruleus.
Branchlets spinose; petals white; flowers umbellate.
Leaves entire.....10. C. huichagorare.
Leaves finely serrulate.
Lower surface of the leaf finely white-sericeous between the nerves.
Leaves suborbicular, rounded at base, glabrate on the upper surface. 11. C. pueblensis.
Leaves oval-obovate to cuneate-obovate, obtuse or cuneate at base, sericeous on the upper surface.....12. C. durangoinus.
Lower surface of the leaf tomentose, or the pubescence consisting of long loose hairs, these all or chiefly confined to the nerves.
Capsule coarsely tuberculate and cristate.....13. C. ferox.
Capsule smooth.
Leaves sparsely or densely tomentose beneath, the hairs matted.
Leaves glabrous or nearly so on the upper surface, very sparsely tomentose beneath.....14. C. depressus.
Leaves densely pubescent on the upper surface or very tardily glabrate, densely tomentose beneath.....15. C. endlichii.
Leaves pilose beneath along the nerves with long straight hairs. 16. C. buxifolius.

1. **Ceanothus verrucosus** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 267. 1838.
Northern Baja California. Southern California; type from San Diego.
Low shrub with gray or brown branches; leaves cuneate-obovate or rounded-obovate, 4 to 12 mm. long, rounded or retuse at apex, entire or denticulate, minutely tomentulose beneath or glabrate; flowers white.

2. **Ceanothus goldmanii** Rose, Contr. U. S. Nat. Herb. 12: 284. 1909.
Mountains of Baja California; type from La Huerta.
Stout shrub, 2 to 4 meters high, often forming dense thickets; leaves cuneate-obovate to suborbicular, 7 to 14 mm. long, coarsely dentate, minutely tomentulose or glabrate beneath.
This has been reported from Baja California as *C. rigidus* Nutt.

3. **Ceanothus cuneatus** (Hook.) Nutt.; Torr. & Gray, Fl. N. Amer. 1: 267. 1838.
Rhamnus cuneata Hook. Fl. Bor. Amer. 1: 124. 1829.
Ceanothus submontanus Rose, Contr. U. S. Nat. Herb. 12: 284. 1909.
Baja California. California and Oregon.
Shrub, 1 to 3 meters high, with gray branches; leaves 6 to 15 mm. long, obtuse or rounded at apex, nearly sessile, minutely tomentulose beneath.

4. **Ceanothus lanuginosus** (Jones) Rose, Contr. U. S. Nat. Herb. **12**: 284. 1909.
Ceanothus greggii lanuginosus Jones, Proc. Calif. Acad. II. **5**: 620. 1895.
Chihuahua and Coahuila; type from Santa Eulalia Mountains, Chihuahua.
Shrub with rigid grayish branches; leaves 7 to 15 mm. long, rounded at apex, densely tomentose beneath, tomentose above at first but soon glabrate.

5. **Ceanothus greggii** A. Gray, Pl. Wright. **2**: 28. 1853.
Ceanothus australis Rose, Contr. U. S. Nat. Herb. **12**: 283. 1909.
Chihuahua and Coahuila to San Luis Potosí, Hidalgo, Puebla, and Oaxaca; type from Buenavista, Coahuila. Western Texas to southern Utah.
Low shrub with intricate brown or grayish branches; leaves 6 to 15 mm. long, rounded or obtuse at apex, green and glabrate on the upper surface.

6. **Ceanothus spinosus** Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 267. 1838.
Northern Baja California. Southern California; type from Santa Barbara.
Shrub or small tree, sometimes 7 meters high, with a trunk 15 cm. in diameter; bark red-brown, scaly; leaves elliptic to oblong-oval, 2 to 4 cm. long, rounded or retuse at apex, pale beneath; flowers blue.

7. **Ceanothus divaricatus** Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 266. 1838.
Baja California. California; type from Santa Barbara.
Tall shrub; leaves oblong-ovate to rounded-ovate, 1 to 3 cm. long, obtuse or rounded at apex, often subcordate at base, entire or serrulate; flowers pale blue.
Some of the Baja California specimens have been identified as *C. palmeri* Trel. and *C. cordulatus* Kellogg, but all seem to belong rather to *C. divaricatus*.

8. **Ceanothus tomentosus** Parry, Proc. Davenport Acad. **5**: 190. 1889.
Baja California. California; type from Ione.
Shrub with slender, gray or reddish branches; leaves elliptic or oval-ovate, rounded at base and apex, serrulate, glabrate on the upper surface or minutely velutinous.
Baja California specimens have been determined as *C. sorediatus* Hook. & Arn.

9. **Ceanothus coeruleus** Lag. Gen. & Sp. Nov. 11. 1816.
Ceanothus azureus Desf. Cat. Pl. Paris. 232. 1815, nomen nudum.
Ceanothus bicolor Willd.; Roem. & Schult. Syst. Veg. **7**: 65. 1829.
Ceanothus glandulosus Schlecht. Linnaea **15**: 474. 1841.
Ceanothus azureus parvifolius S. Wats. Proc. Amer. Acad. **23**: 270. 1888.
Ceanothus candolleanus Rose, Contr. U. S. Nat. Herb. **12**: 283. 1909.
Ceanothus parvifolius Rose, Contr. U. S. Nat. Herb. **12**: 284. 1909. Not *C. parvifolius* Trel. 1888.
Sinaloa to Chihuahua, Coahuila, Veracruz, and Chiapas. Guatemala.
Shrub or small tree, 1 to 7.5 meters high; leaves oblong-lanceolate to ovate, acute or obtuse, serrulate, green above and glabrate or sometimes densely pubescent, covered beneath with a rusty tomentum; flowers blue or nearly white. "Chaquira" (Oaxaca, Mexico); "chaquirilla"; "palo colorado"; "tlaxistle," "tnu-yoocó" (Michoacán, Oaxaca, *Seler*); "sayolistle," "cuaicuastle" (Mexico, *Harshberger*).
The bark is said to have tonic and febrifuge properties. A decoction of the leaves is used for sore throat, and the decoction of the roots for venereal diseases. The species was listed by Sessé and Mociño[1] as *C. americanus*.

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[1] Pl. Nov. Hisp. 38. 1887.

The numerous specimens examined are remarkably uniform in their characters, the only exception being a few which are referable to *C. azureus parvifolius* S. Wats. This form is distinguished by its relatively small leaves and reduced inflorescence. Although raised to specific rank by Rose, there appears to be no character by which it can be separated definitely from *C. coeruleus*.

10. Ceanothus huichagorare Loesener, Repert. Sp. Nov. Fedde 8: 298. 1910.

Chihuahua, Coahuila, Sonora, and Jalisco; type from Baquiriachic, Chihuahua.

Low shrub with slender spinose branches; leaves elliptic or oval, 1 to 1.8 cm. long, obtuse or rounded at base and apex, green and glabrate above, appressed-pilose beneath along the nerves.

The specimens to be placed here have usually been determined as *C. buxifolius*. "Huichagorare" is the Tarahumare name of the plant.

11. Ceanothus pueblensis Standl., sp. nov.

Type from Esperanza, Puebla (*Purpus* 5821; U. S. Nat. Herb. no. 464452).

Shrub with short stiff spinose branchlets; leaves short-petiolate, 7 to 10 mm. long, 6 to 8 mm. wide, broadly rounded at each end, 3-nerved, green and glabrate above, densely whitish-sericeous beneath, glandular-serrulate; flowers white, the pedicels glabrous.

12. Ceanothus durangoinus Loesener, Repert. Sp. Nov. Fedde 8: 297. 1910.

Durango; type from Hacienda Santa Catalina, Sierra de Gamón, altitude 2,200 meters.

Low, densely branched shrub with gray or brownish branches; leaves short-petiolate, 0.8 to 1.7 cm. long, green above, gray beneath.

13. Ceanothus ferox Standl., sp. nov.

Type from mountains near Miquihuana, Tamaulipas (*Nelson* 4479; U. S. Nat. Herb. no. 332667).

Branchlets slender, brownish, spinose, puberulent; leaves short-petiolate, oval-elliptic to suborbicular, 5 to 10 mm. long and nearly as wide, rounded at each end, 3-nerved, glandular-serrulate, green and glabrous above, paler green beneath and appressed-pilose along the nerves; capsule 5 mm. broad, densely covered with irregular ridges and tubercles.

14. Ceanothus depressus Benth. Pl. Hartw. 8. 1839.

San Luis Potosí and Zacatecas; type from Zacatecas.

Shrub with stout spinose branches; leaves short-petiolate, oblong-elliptic or elliptic, 1 to 2 cm. long, obtuse or rounded at each end.

Specimens from San Luis Potosí are referred here upon the authority of Watson, but the writer does not feel certain that they are correctly determined.

15. Ceanothus endlichii Loesener, Repert. Sp. Nov. Fedde 8: 298. 1910.

Chihuahua and Sonora; type from Chihuahua, in the Sierra Madre between Basagote and Cerracahue, altitude 1,600 meters.

Low spiny shrub; leaves short-petiolate, oblong-elliptic to rounded-ovate, 1 to 3 cm. long, grayish, rounded at each end.

Some of the specimens have been determined previously as *C. fendleri venosus* Trel., and a Sonoran specimen has been reported as *C. buxifolius*.

16. Ceanothus buxifolius Willd.; Roem. & Schult. Syst. Veg. 5: 300. 1819.

Chihuahua, Durango, and Hidalgo; type from Real del Monte, Hidalgo.

Low spiny shrub; leaves elliptic-obovate to broadly elliptic, 8 to 16 mm. long, rounded to acutish at base, rounded at apex, petiolate.

It is possible that the material at hand represents two species, but the forms seem identical except in leaf shape.

DOUBTFUL SPECIES.

CEANOTHUS MOCINIANUS DC. Prodr. **2**: 32. 1825.

CEANOTHUS PAUCIFLORUS DC. Prodr. **2**: 33. 1825. Both this and the preceding were based upon plates of Sessé and Mociño. It is doubtful whether they belong to the genus.

10. SAGERETIA Brongn. Ann. Sci. Nat. 10: 359. 1827.

Shrubs or small trees, the branchlets slender, often spinose; leaves subopposite, short-petiolate, pinnately nerved, entire or serrate; flowers minute, glomerate along the branches of the panicle; calyx 5-lobate; petals 5, cucullate, clawed; stamens 5; fruit drupaceous, juicy, the 3 nutlets coriaceous, indehiscent.

Many of the species have edible fruit. The leaves of *S. theezans* (L.) Brongn. are used in China as a substitute for tea.

Leaves obtuse or rounded at apex, obtuse at base, 1 to 2 cm. long--**1. S. wrightii.**
Leaves acute or acuminate, rounded or subcordate at base, 3 to 6 cm. long. **2. S. elegans.**

1. Sageretia wrightii S. Wats. Proc. Amer. Acad. **20**: 358. 1885.

Sonora to Jalisco; type from Santa Cruz, Sonora. Western Texas and southern Arizona.

Densely branched shrub, 0.5 to 3 meters high, the branchlets spinose; leaves oblong to elliptic, obscurely serrulate or entire, lustrous, tomentulose when young but soon glabrate; inflorescence little exceeding the leaves.

This was reported by Hemsley as *S. michauxii* Brongn.

2. Sageretia elegans (H. B. K.) Brongn. Ann. Sci. Nat. **10**: 359. 1827.

Rhamnus elegans H. B. K. Nov. Gen. & Sp. **7**: 53. *pl. 619*. 1825.

Sinaloa to Veracruz and Chiapas. Central America, Colombia, and Peru.

Slender sarmentose shrub, 3 to 4.5 meters high; leaves lanceolate to ovate-elliptic, deciduous, serrulate, tomentulose beneath when young but soon glabrate; panicles very large and broad, tomentose, the flowers whitish; fruit 6 to 8 mm. in diameter.

Sageretia salamensis Loesener,[1] described from Guatemala, is probably not separable from this species.

11. RHAMNUS L. Sp. Pl. 193. 1753.

Unarmed trees or shrubs; leaves opposite, petiolate, persistent or deciduous, pinnate-nerved, entire or toothed; flowers green, perfect or polygamo-dioecious, axillary, solitary, fasciculate, or umbellate; calyx 4 or 5-lobate; petals 4 or 5 or none; stamens 4 or 5; fruit drupaceous, 2 to 4-celled, the nutlets osseous or cartilaginous.

The species are known by the English name "buckthorn." *R. cathartica* L., of Europe, yields a green dye, and the fruit and bark have purgative properties. The dried bark of *R. purshiana* DC., of the western United States, is an official drug, known as "cascara sagrada." The bark is yellow within, with a bitter and rather nauseous taste; its extract is used in medicine as a laxative. *R. californica* Eschsch. also has similar properties, and much of the drug of commerce is probably derived from this species.

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[1] Verh. Bot. Ver. Brand. **51**: 30. 1910.

Flowers all or mostly in pedunculate umbels.
  Leaves covered beneath with a minute close white tomentum.
    1. R. tomentella.
  Leaves green beneath, short-pilose, glabrate, or with a loose coarse tomentum.
    Leaves acuminate, long-petiolate ..... **2. R. discolor.**
    Leaves rounded or obtuse at apex or sometimes acute, short-petiolate.
      Leaf blades broadly oval, less than twice as long as broad, densely villous-tomentose beneath ..... **3 R. palmeri.**
      Leaf blades oblong to elliptic, short-pilose or glabrate beneath.
        4. R. betulaefolia.
Flowers solitary in the axils or in sessile umbels.
  Leaves entire, glabrous. Petals none ..... **5. R. brandegeana.**
  Leaves serrulate or dentate or if (rarely) entire, copiously pubescent.
    Fruit normally dicoccous; leaves persistent, often pungent-dentate; sepals usually 4.
      Leaves linear-oblong, 3 mm. wide or less ..... **6. R. stenophylla.**
      Leaves elliptic-oblong to orbicular, 5 to 35 mm. wide.
        Leaves acute or acutish ..... **7. R. serrata.**
        Leaves rounded or very obtuse at apex.
          Leaves orbicular to rounded-obovate, 7 to 35 mm. wide.
            8. R. ilicifolia.
          Leaves oval to elliptic-oblong, 5 to 8 mm. wide ..... **9. R. microphylla.**
    Fruit tricoccous; leaves mostly deciduous, not pungent-dentate; sepals 5.
      Leaves rounded or very obtuse at apex.
        Leaves densely pilose, 1.5 to 3 cm. wide ..... **10. R. pringlei.**
        Leaves nearly glabrous, less than 1 cm. wide ..... **11. R. macrocarpa.**
      Leaves acute or acuminate.
        Leaves elliptic, abruptly short-acuminate ..... **12. R. capreaefolia.**
        Leaves mostly oblong or ovate-oblong, acute or acuminate.
          13. R. mucronata.

1. Rhamnus tomentella Benth. Pl. Hartw. 303. 1848.

Rhamnus californica tomentella Brewer & Wats. Bot. Calif. **1**: 101. 1876.

Northern Baja California. New Mexico to southern California.

Large shrub with tomentulose branchlets; leaves oblong, 3.5 to 6 cm. long, rounded to acute at apex, green on the upper surface and minutely puberulent, the lateral nerves very prominent beneath, the margins revolute, subentire; flowers 5-parted, puberulent; fruit usually dicoccous.

2. Rhamnus discolor (Donn. Smith) Rose, Contr. U. S. Nat. Herb. **5**: 51. 1903.

Rhamnus capreaefolia discolor Donn. Smith, Bot. Gaz. **20**: 200. 1893.

Oaxaca. Guatemala to Costa Rica; type from Cobán, Guatemala.

Small tree; leaves long-petiolate, deciduous, mostly elliptic or ovate-elliptic, 6 to 15 cm. long, pubescent beneath or finally glabrate, obscurely serrulate; umbels densely pubescent, some of them sessile and some pedunculate; flowers 5-parted, green; fruit usually tricoccous. "Duraznillo" (Costa Rica).

3. Rhamnus palmeri S. Wats. Proc. Amer. Acad. **22**: 403. 1887.

Known only from the vicinity of Tequila, Jalisco, the type locality.

Shrub, 1 to 2 meters high, with tomentose branches; leaves very short-petiolate, 2 to 7 cm. long, broadly rounded at base and apex, coarsely or finely serrate, densely pilose on the upper surface; umbels partly sessile and partly pedunculate; fruit tricoccous.

4. **Rhamnus betulaefolia** Greene, Pittonia 3: 16. 1896.

Rhamnus californica betulaefolia Trel. in A. Gray, Syn. Fl. 1[1]: 408. 1897.

Rhamnus revoluta Rose, Contr. U. S. Nat. Herb. 8: 51. 1903.

Rhamnus ellipsoidea Greene, Leaflets 2: 267. 1912.

Rhamnus confinis Greene, Leaflets 2: 267. 1912.

Chihuahua, Sonora, Durango, and Nuevo León. Western Texas to southern Arizona; type from Mogollon Mountains, New Mexico.

Large shrub; leaves short-petiolate, oblong to broadly elliptic, 4 to 10 cm. long, acute or obtuse, bright green, pubescent or glabrate on the upper surface; umbels puberulent; fruit tricoccous.

5. **Rhamnus brandegeana** Standl.

Rhamnus purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 274. 1912. Not *R. purpusi* Schelle, 1903.

Tamaulipas and San Luis Potosí; type from Minas de San Rafael, San Luis Potosí.

Small tree, glabrous throughout or nearly so; leaves slender-petiolate, ovate or oblong-ovate, 4 to 8 cm. long, obtuse or acutish, bright green, the margins revolute; petals none.

The writer has seen four collections of this species, including one (without locality) obtained by Thomas Coulter, but all are without fruit. The generic position of the plant is uncertain.

6. **Rhamnus stenophylla** Standl., sp. nov.

Mountains of Tepic; type collected in the Sierra Madre (*Rose* 3464; U. S. Nat. Herb. no 302441).

Branches brown, puberulent; leaves short-petiolate, 6 to 12 mm. long, obtuse or rounded at apex, obscurely serrulate, sparsely pilosulous beneath when young but soon glabrate, the margins somewhat revolute; pedicels solitary or geminate, puberulent; calyx 5-lobate; petals much shorter than the sepals; fruit 5 mm. long, glabrous.

7. **Rhamnus serrata** Willd.; Roem. & Schult. Syst. Veg. 5: 295. 1819.

Rhamnus serrulata H. B. K. Nov. Gen. & Sp. 7: 51. *pl. 607*. 1825.

San Luis Potosí to Mexico; type from San Agustín de las Cuevas.

Shrub or small tree, sometimes 6 meters high; leaves short-petiolate, oblong or elliptic-oblong, 2 to 5.5 cm. long, acute or obtuse, coriaceous, sharply serrulate, yellowish beneath, at first minutely pilose but soon glabrate; umbels glabrous; fruit 6 to 7 mm. long. "Capulincillo" (San Luis Potosí); "tlalcapollin" (Nahuatl, *Urbina*).

8. **Rhamnus ilicifolia** Kellogg, Proc. Calif. Acad. 2: 37. 1863.

Rhamnus insularis Greene, Bull. Calif. Acad. II. 2: 392. 1887.

Rhamnus crocea insularis Sarg. Gard. & For. 2: 364. 1889.

Baja California. California and Arizona; type from Clear Lake, California.

Shrub or small tree, sometimes 7 meters high, with a trunk 20 cm. in diameter; bark thin, gray; leaves 1.5 to 5 cm. long, obtuse or rounded at apex, rigid, spinose-dentate, yellowish beneath, glabrous or nearly so; petals none; fruit red, 5 to 7 mm. long.

Sometimes known as "California holly." *R. insularis* is a form with large, less conspicuously toothed leaves. *R. ilicifolia* is closely related to *R. crocea* Nutt., and may not be specifically distinct. That species is said to have yellow fine-grained heavy wood. The fruit was eaten by the Indians of California. It is said to give a conspicuous red tinge to the body of one who eats it in quantity. The bark has an agreeable odor and is rather bitter; it has tonic and slightly laxative, or in large doses cathartic, properties.

9. **Rhamnus microphylla** Willd.; Roem. & Schult. Syst. Veg. **5**: 295. 1819.

Coahuila, San Luis Potosí, and Hidalgo; type from Real del Monte, Hidalgo.

Low shrub with brown puberulent branches; leaves 7 to 15 mm. long, rounded at apex, serrulate, glabrate, often yellowish beneath; flowers glabrous; petals present; fruit 5 to 6 mm. long.

10. **Rhamnus pringlei** Rose, Contr. U. S. Nat. Herb. **8**: 51. 1903.

Oaxaca; type from foothills of Sierra de San Felipe.

Small shrub; leaves short-petiolate, oblong-elliptic to suborbicular, 2 to 5.5 cm. long, irregularly serrulate; umbels densely pilose; fruit about 5 mm. long, glabrous.

11. **Rhamnus macrocarpa** Standl., sp. nov.

Type collected on hills near Pátzcuaro, Michoacán (*Pringle* 5331; U. S. Nat. Herb. no. 316795).

Branches brown, puberulent; leaves short-petiolate, oblong or narrowly elliptic-oblong, 1.2 to 3 cm. long, rounded or obtuse at apex, crenate-serrulate, green above, sparsely puberulent, yellowish beneath, puberulent along the nerves; pedicels puberulent; fruit 1 cm. broad.

12. **Rhamnus capreaefolia** Schlecht. Linnaea **15**: 464. 1841.

Veracruz and Oxaca; type from Malpais de Naolinco, Veracruz.

Tree, 4.5 to 6 meters high; leaves 4 to 14 cm. long, thin, green or yellowish beneath, obscurely serrulate, pubescent or glabrate beneath; flowers pilose; petals present; fruit 5 to 7 mm. in diameter, often pilose.

13. **Rhamnus mucronata** Schlecht. Linnaea **15**: 465. 1841.

Rhamnus nelsoni Rose, Contr. U. S. Nat. Herb. **8**: 50. 1903.

Rhamnus obliqua Rose, Contr. U. S. Nat. Herb. **8**: 51. 1903.

Tepic to Zacatecas, Mexico, and Chiapas; type collected near Chantla and Angangueo, Michoacán.

Shrub or small tree, 1.5 to 4.5 meters high; leaves 4 to 11 cm. long, thin, bright green, often yellowish beneath, serrulate or subentire, pubescent or glabrate; flowers puberulent or short-pilose; petals present; fruit 5 to 7 mm. long, glabrous.

DOUBTFUL SPECIES.

RHAMNUS TERNIFLORA DC. Prodr. **2**: 26. 1825. Based upon one of Sessé and Mociño's plates.

92. VITACEAE. Grape Family.

REFERENCE: Planchon, Monographie des Ampélidées vraies, in DC. Monogr. Phan. **5**: 305–654. 1887.

Scandent shrubs or sometimes herbs, usually with tendrils; leaves alternate, simple or compound, petiolate; flowers small, perfect or polygamous, usually in cymes; calyx entire or 4 or 5-dentate; petals 4 or 5, valvate; stamens 4 or 5, opposite the petals; fruit a 1 to 4-celled berry.

Leaves digitately 5 to 7-foliolate ..... 1. **PARTHENOCISSUS.**
Leaves simple, trifoliolate, or ternately compound.
  Petals coherent into a cap, caducous. Leaves simple ..... 2. **VITIS.**
  Petals distinct, spreading.
    Petals 4; disk 4-lobate ..... 3. **CISSUS.**
    Petals usually 5; disk 5-lobate or 10-striate.
      Disk annular, 10-striate ..... 4. **AMPELOCISSUS.**
      Disk cupular, 5-lobate ..... 5. **AMPELOPSIS.**

1. PARTHENOCISSUS Planch. in DC. Monogr. Phan. 5: 447. 1887.

1. **Parthenocissus quinquefolia** (L.) Planch. in DC. Monogr. Phan. 5: 448. 1887.

Hedera quinquefolia L. Sp. Pl. 202. 1753.

Vitis quinquefolia Lam. Tabl. Encycl. 2: 135. 1793.

Ampelopsis quinquefolia Michx. Fl. Bor. Amer. 1: 160. 1803.

Nuevo León, Veracruz, Hidalgo, and Michoacán. Widely distributed in the United States and Canada, and in Cuba and the Bahamas.

Scandent shrub, usually glabrous throughout; leaflets 5, elliptic to oblanceolate, 5 to 15 cm. long, acute or acuminate, coarsely serrate-dentate; flowers perfect or polygamo-monoecious, green, in compound cymes; petals 5, spreading; fruit blue, 8 to 9 mm. in diaméter, 2 or 3-seeded.

A handsome vine, often planted for ornamental purposes. Known in the United States as "Virginia creeper." The leaves turn red in autumn. The bark has been used in domestic medicinal practice as an alterative, tonic, and expectorant, and for dropsy. The crushed leaves applied to the skin are said to produce blisters. The fruit is not edible.

Parthenocissus quinquefolia hirsuta (Donn) Planch. (*Ampelopsis hirsuta* Donn; *Parthenocissus hirsuta* Small; *Ampelopsis pubescens* Schlecht.) is a form with leaflets sparsely pilose beneath. Specimens from Nuevo León and Veracruz belong here.

2. VITIS L. Sp. Pl. 202. 1753.

Climbing shrubs; leaves long-petiolate, simple, toothed or lobed; flowers mostly dioecious or polygamo-dioecious, cymose-paniculate; petals caducous; ovary 2-celled; fruit a globose berry, pulpy, edible.

The Mexican native grapes, like those of the United States, are difficult of separation, and their characters poorly marked.

The cultivated grapes of Mexico are chiefly of the Old World type, being derived from *Vitis vinifera* L. The cultivated grapes of the eastern United States are derived from the native species. European grapes ("vid," the plant; "uva," "parra," the fruit; "bicholi," "yaga-bicholi," Zapotec) are said to have been introduced into Mexico about 1522, and their culture upon a large scale was begun at once, especially for the purpose of making wine. During at least a portion of the Spanish occupation, however, the local manufacture of wine was prohibited by the Spanish Government, for the protection of the wine industry of Spain. Clavigero states that vineyards were established in Baja California by the Jesuits, and that grapes were more successful there than any other fruit except figs.

Oviedo relates that grapes were cultivated in Santo Domingo at the beginning of the sixteenth century, and he mentions particularly the vineyard of Diego Colón, which was destroyed through neglect. He refers to the wild grapes (*Vitis tiliifolia*) of Santo Domingo which, he says are good, "that is, for wild grapes," and suggests that they might be improved by cultivation. Wine is occasionally made in Mexico from the wild grapes. The Indians of the United States sometimes dried the fruit for winter use, and in spring they tapped the larger vines to obtain the sap, which was used as a beverage.

Wild grapes are mentioned by Hernández[1] in a chapter entitled "De Ceualchilchiltic, seu vite sylvestri, Lambruscave indigena." He states that the name "xocomecatl" also was applied to the plant.

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[1] Thesaurus 128. 1651.

Leaves glabrate beneath when mature, or pilosulous, the tomentum, if any, confined chiefly to the venis.
  Plants scarcely climbing, the tendrils mostly abortive; leaves comparatively small ---------- 1. V. arizonica.
  Plants climbing, the tendrils well developed; leaves large.
    Tomentum none on the leaves ---------- 2. V. bourgaeana.
    Tomentum usually present on the lower surface of the leaves along the veins ---------- 3. V. berlandieri.
Leaves with persistent loose or close tomentum over the whole lower surface.
  Tomentum wholly gray or whitish ---------- 4. V. cinerea.
  Tomentum rusty or reddish, at least along the veins ---------- 5. V. tiliifolia.

1. **Vitis arizonica** Engelm. Amer. Nat. **2**: 321. 1868.

Baja California and Sonora to Coahuila and Tamaulipas. Western Texas to Arizona and Utah.

Plants much branched, the stems floccose-tementose; leaves broadly cordate, mostly 4 to 6 cm. long, acute or short-acuminate, coarsely dentate, sometimes shallowly lobate, loosely floccose beneath when young; fruit black, 2 or 3-seeded. "Vid," "parra" (Tamaulipas).

Havard[1] remarks concerning this species, "*Vitis arizonica* has been found growing in rows near Fort Whipple, Arizona, which may be accepted as conclusive evidence of its culture by the Pueblo Indians."

2. **Vitis bourgaeana** Planch. in DC. Monogr. Phan. **5**: 368. 1887.

Jalisco to Morelos, Puebla, and Veracruz; type from the region of Orizaba, Veracruz.

Stems loosely floccose-tomentose; leaves broadly cordate, 7 to 15 cm. long. acuminate, irregularly dentate, often shallowly 3-lobate or deeply 5-lobate, glabrate above, beneath sparsely pilosulous or glabrate.

3. **Vitis berlandieri** Planch. Compt. Rend. Acad. Sci. (Paris) **91**: 425. 1880.

Coahuila to Veracruz. Western Texas.

Stems loosely floccose-tomentose or glabrate; leaves broadly cordate, 9 to 14 cm. long, often as broad as long, short-acuminate, coarsely dentate and often shallowly 3-lobate, glabrate above, puberulent beneath; fruit 6 to 8 mm. in diameter, purple, slightly glaucous, with pleasant flavor. "Uva cimarrona" (Veracruz).

4. **Vitis cinerea** Engelm.; Bushberg, Cat. ed. 3. 17. 1883.

Vitis aestivalis cinerea Engelm.; A. Gray, Man. ed. 5. 697. 1867.

Vitis biformis Rose, Contr. U. S. Nat. Herb. **8**: 315. 1905.

Sonora to Coahuila, Tamaulipas, San Luis Potosí, and Durango. Central and southern United States.

Young branches floccose-tomentose; leaves broadly cordate, 6 to 14 cm. long, crenate-dentate, often shallowly 3-lobate, floccose-tomentose above when young but soon glabrate; fruit black, 6 to 8 mm. in diameter, acid. "Uva" (San Luis Potosí); "parra silvestre" (Tamaulipas).

5. **Vitis tiliifolia** Humb. & Bonpl.; Roem. & Schult. Syst. Veg. **5**: 320. 1819.

Vitis caribaea DC. Prodr. **1**: 634. 1824.

Vitis blancoii Munson, Wild Grapes N. Amer. 14. 1890.

Sinaloa to San Luis Potosí, Veracruz, Tabasco, and Chiapas. Southern Florida, West Indies, Central America, and northern South America.

Young branches floccose-tomentose; leaves broadly cordate, 7 to 18 cm. long, usually abruptly acuminate, rather finely dentate, rarely lobate, usually

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[1] Bull. Torrey Club **22**: 104. 1895.

densely tomentose beneath; fruit 6 to 8 mm. in diameter, purple. "Parra silvestre" (Tabasco); "bejuco de agua" (Oaxaca, Nicaragua, Colombia, Porto Rico); "bejuco de cazadores," "pichol" (Oaxaca); "uva" (Michoacán, Guerrero); "uvilla cimarrona" (Jalisco, Veracruz); "parra broncadora" (Jalisco); "parra" (Nicaragua, Porto Rico, Santo Domingo, Costa Rica); "agrá" (Costa Rica, Colombia; a corruption of *agraz*, the name for the wild grape of Spain); "parra cimarrona" (Cuba, Santo Domingo, Porto Rico); "bejuco de parra" (Guatemala); "uva cimarrona" (Nicaragua); "bejuco caro" (Santo Domingo).

The stems sometimes attain a diameter of 20 cm. From a section of the stem a considerable amount of water may be obtained, a fact of which advantage is often taken by hunters or other persons in forests where the ordinary sources of water are wanting. The sap is reputed to have diuretic properties and a decoction of the leaves has been employed as a remedy for fevers. Descourtilz states that the leaves were applied as poultices for gout.

It is probably this species to which the names *Vitis indica* and *V. labrusca* were applied by Sessé and Mociño.[1]

3. CISSUS L. Sp. Pl. 117. 1753.

Vines, the stems herbaceous or woody; leaves simple or ternate, usually succulent; flowers mostly perfect, 4-parted, cymose-corymbose; ovary 2-celled; fruit 1 to 4-seeded, usually inedible.

Leaves simple, entire or dentate, never lobate.
  Leaves sessile or very short-petiolate, densely soft-pilose beneath. **1. C. arsenii.**
  Leaves long-petiolate.
    Pedicels densely pubescent ---------- **2. C. subtruncata.**
    Pedicels glabrous.
      Leaves broadly cuneate at base, broadest near the apex, nearly entire, glabrous ---------- **3. C. sinaloae.**
      Leaves rounded or cordate at base, broadest at or below the middle, usually conspicuously dentate, glabrous or pubescent. **4. C. sicyoides.**
Leaves trifoliolate, or simple and lobate.
  Flowers green; leaves very thick and fleshy.
    Leaves deeply 5-lobate ---------- **5. C. tuberosa.**
    Leaves 3-lobate or trifoliolate ---------- **6. C. trifoliata.**
  Flowers red; leaves thin.
    Leaflets glabrous beneath, usually 1.5 to 4 cm. long ---------- **7. C. microcarpa.**
    Leaflets pubescent beneath, at least along the nerves.
      Flowers 3 to 4 mm. long ---------- **8. C. cucurbitina.**
      Flowers 1.5 to 2 mm. long.
        Leaflets rounded at apex ---------- **9. C. salutaris.**
        Leaflets all or mostly abruptly acute or acuminate at apex. **10. C. rhombifolia.**

1. **Cissus arsenii** Standl., sp. nov.

Type from Morelia, Michoacán (*Arsène* 10006; U. S. Nat. Herb. no. 1,001,397).

Stems densely puberulent; petioles stout, 2 to 7 cm. long; leaves ovate-rhombic, 4 to 6.5 cm. long, obtuse or rounded at apex, broadly cuneate or rounded at base, serrate, green above but densely pubescent; peduncles 1 to 1.5 cm. long, the cymes dense, few-flowered, 1 to 2 cm. broad; pedicels glabrous; flowers green.

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[1] Pl. Nov. Hisp. 39. 1887.

2. Cissus subtruncata Rose, Contr. U. S. Nat. Herb. **12**: 284. 1909.

Guerrero, Oaxaca, Puebla, and Morelos; type collected near the city of Oaxaca.

Stems densely pubescent; leaves cordate to subreniform, 4 to 12 cm. long and about as broad, rounded to short-acuminate at apex, truncate to cordate at base, serrate-dentate, densely pubescent; cymes pedunculate, equaling or longer than the leaves; flowers green.

3. Cissus sinaloae Standl., sp. nov.

Type collected between Rosario and Acaponeta, Tepic (*Rose* 1872; U. S. Nat. Herb. no. 300756).

Glabrous throughout; petioles 6 to 12 mm. long; leaf blades oblong-obovate, 8 to 12 cm. long, truncate or obtuse at apex, thin, with a few remote appressed serrations; inflorescence long-pedunculate, the cymes umbellate; fruit obovoid, 6 mm. long.

4. Cissus sicyoides L. Syst. Nat. ed. 10. **2**: 897. 1759.

Cissus elliptica Schlecht. & Cham. Linnaea **5**: 440. 1830.

Sonora to Tamaulipas, Yucatán, and Chiapas. Widely distributed in tropical America.

Slender vine, often very long; leaves oblong-ovate to subreniform, 4 to 16 cm. long, obtuse to acuminate, rounded to deeply cordate at base, coarsely or finely serrate, varying from glabrous to densely pubescent; cymes corymbiform, loose and open; fruit globose-obovoid, 1-seeded, black. "Hierba del buey" (Tamaulipas); "tripa de zopilote" (Sinaloa); "bejuco loco" (Tabasco, *Rovirosa*); "tabkanil" (Yucatán, Maya); "vid silvestre" (Hidalgo, Veracruz); "tripas de Judas" (Valley of Mexico, Morelos, Hidalgo, Oaxaca); "tumba-vaqueros" (Valley of Mexico, Hidalgo, Morelos); "molonqui" (Valley of Mexico, *Ramírez*); "temecatl" (Nahuatl); "tripa de vaca" (Guanajuato); "iasú," "bejuco iasú" (Costa Rica); "bejuco comemano" (Guatemala, Honduras); "bejuco castro," "bejuco chirriador" (Colombia); "uvilla" (Nicaragua); "ubí" (Cuba); "caro," "bejuco de caro" (Porto Rico, Santo Domingo).

The species is a variable one, especially in leaf form and pubescence, and many segregates and varieties have been proposed. The inflorescence is often attacked by a smut, *Mycosyrinx cissi*, and it is then greatly enlarged and modified. This diseased form was made the type of a new genus, *Spondylantha*, by Presl.

The tough stems are sometimes used as a substitute for cordage, and in Costa Rica for making baskets. When cut they yield a plentiful supply of watery sap. The leaves, when macerated in water, give a lather like that produced by soap, and they are employed for washing clothes. They have a slightly acid flavor. Sometimes they are applied to sores or inflammations, and in Mexico a decoction of the stems is used as a remedy for rheumatism. The fruit is said to yield a blue dye.

Some of the Mexican specimens have been determined incorrectly as *Ampelopsis cordata* Michx.

It is this species, apparently, which is figured by Hernández[1] as "Tlacamazatcazqui y papan." It is perhaps also the plant figured[2] and briefly described as "yztac çaçalic, seu Herba glutinosa, & candenti." The decoction of the root of the latter, he states, was administered for diarrhea and as a diuretic, and used in baths to relieve pain of various sorts.

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[1] Thesaurus 414. 1651.

[2] Thesaurus 283. 1651.

5. **Cissus tuberosa** DC. Prodr. **1**: 629. 1824.

Guerrero, Oaxaca, and Puebla.

Stems pubescent or glabrate; leaves 4 to 9 cm. long, the divisions narrow or broad, coarsely dentate or deeply lobate, sparsely pubescent or glabrate; pedicels glabrous; fruit subglobose, 5 to 6 mm. in diameter. "Coral de Colima," "bejuco de coral" (Oaxaca).

6. **Cissus trifoliata** L. Syst. Nat. ed. 10. **2**: 897. 1759.

Sicyos trifoliata L. Sp. Pl. 1013. 1753.

Cissus acida L. Sp. Pl. ed. 2. 170. 1762.

Baja California to Colima, Coahuila, Yucatán, and Oaxaca. Widely distributed in tropical America.

Plants glabrous or sparsely pubescent; leaves mostly trifoliolate, the leaflets 2 to 9 cm. long, usually broadly cuneate, coarsely dentate or lobate; cymes equaling or longer than the leaves; fruit purple or nearly black, 5 to 8 mm. long. "Bolontobi" (Yucatán); "hierba del buey" (Chihuahua, Sonora, *Ramírez*); "uvilla" (Nicaragua).

This has been reported from Yucatán as *Vitis arborea* L. Some of the Mexican specimens have been referred to *C. incisa* (Nutt.) Des Moul., a form which is doubtfully distinct from *C. trifoliata*. In Yucatán the mucilaginous leaves are applied as poultices for sores and cutaneous diseases. The leaves have an acid flavor and Barham states that in Jamaica they were eaten as a sauce with other food. Havard states that the large tubers borne upon the roots are very poisonous, causing violent vomiting and purging, and he reports that the leaves sometimes produce an eruption upon the skin, like that caused by poison ivy (*Rhus radicans*).

7. **Cissus microcarpa** Vahl, Eclog. Amer. **1**: 16. 1796.

Veracruz and Chiapas. West Indies and northern South America.

Glabrous throughout or nearly so; leaves trifoliolate, the leaflets obliquely ovate, elliptic, or rhombic, obtuse to acuminate, irregularly appressed-serrate; fruit 6 to 7 mm. in diameter.

8. **Cissus cucurbitina** Standl., sp. nov.

Type from Cuernavaca, Morelos (*Rose & Rose* 11047; U. S. Nat. Herb. no. 453834).

Petioles 6.5 to 9.5 cm. long; leaves simple or trifoliolate; simple leaves rounded-cordate, 14 to 16 cm. long, shallowly 3-lobate, deeply cordate at base, rounded at apex, remotely appressed-serrate, glabrous or nearly so; leaflets of trifoliolate leaves rhombic, appressed-serrate; cymes short-pedunculate, densely many-flowered, about 7 cm. broad, covered with sparse appressed whitish hairs; calyx 2 to 2.5 mm. long; corolla 3 mm. long.

The material available is incomplete, but the very large flowers indicate that the plant is specifically distinct.

9. **Cissus salutaris** H. B. K. Nov. Gen. & Sp. **5**: 225. 1821.

Oaxaca and Veracruz. Colombia and Venezuela; type from Venezuela.

Stems sparsely hispidulous; leaflets 3, obovate or elliptic-obovate, 4.5 to 9 cm. long, coarsely crenate-serrate, with conspicuous reticulate venation, hairy on both surfaces or finally glabrate; flowers umbellate-cymose, the pedicels hairy.

10. **Cissus rhombifolia** Vahl, Eclog. Amer. **1**: 11. 1796.

Sinaloa to San Luis Potosí, Veracruz, and Oaxaca. West Indies, Central America, and South America.

Leaflets 3, ovate, rhombic, or broadly elliptic, 4 to 10 cm. long, all petiolulate, sharply serrate, hirtellous on one or both surfaces; flowers in cymose

umbels, the pedicels hairy; petals often hirtellous; fruit black. "Palo huaco (hueco ?)" (San Luis Potosí, *Palmer*).

Palmer reports that in San Luis Potosí an infusion of the stems in "aguardiente" is used as a remedy for stomach troubles. The species has been reported from Yucatán, where it is said to bear the Maya name "xtab-canil."

DOUBTFUL SPECIES.

CISSUS MEXICANA DC. Prodr. 1: 631. 1824. Described from Mexico; said to haev 5 leaflets, and perhaps a synonym of *Parthenocissus quinquefolia.*

4. AMPELOCISSUS Planch. in DC. Monogr. Phan. 5: 368. 1887.

1. **Ampelocissus acapulcensis** (H. B. K.) Planch. in DC. Monogr. Phan. 5: 403. 1887.

Vitis acapulcensis H. B. K. Nov. Gen. & Sp. 7: 230. 1825.

? *Ampelocissus erdwendbergii* Planch. in DC. Monogr. Phan. 5: 404. 1887.

Sinaloa to Guerrero and Morelos; type from Acapulco, Guerrero. El Salvador.

Large vine; leaves broadly cordate, 7 to 16 cm. long, acute, erose-dentate, angulate or often shallowly 3-lobate, densely ferruginous-tomentose beneath, at least when young; flowers dioecious, the staminate in very dense cymes about 8 cm. broad, the branches densely tomentose; petals red, glabrous; fruit wine-colored, with a bloom, 12 to 25 mm. in diameter. "Uva" (Guerrero).

In general appearance the plant is similar to some species of *Vitis*, but the large fruits and inflorescences are unlike those of any native Mexican *Vitis*. No information is available concerning the quality of the fruit; but its large size indicates that the plant might be a valuable one in cultivation.

5. AMPELOPSIS Michx. Fl. Bor. Amer. 1: 159. 1803.

Large vines with coiling tendrils; leaves simple or compound; flowers polygamo-dioecious or polygamo-monoecious; petals 5; fruit 2 to 4-seeded, not edible.

Ampelopsis arborea (L.) Rusby has been reported from Yucatán, but the report is based upon specimens of *Cissus trifoliata* L.

Leaves simple ..... 1. A. cordata.
Leaves trifoliolate ..... 2. A. mexicana.

1. **Ampelopsis cordata** Michx. Fl. Bor. Amer. 1: 159. 1803.

Veracruz. Southern and central United States.

Glabrous throughout or nearly so; leaves broadly ovate, deltoid-ovate, or cordate-ovate, 5 to 12 cm. long, acute or acuminate, coarsely serrate; cymes small and loose; fruit 2-seeded, bluish, 4 to 6 mm. in diameter.

2. **Ampelopsis mexicana** Rose, Contr. U. S. Nat. Herb. 8: 51. 1905.

Sinaloa to Guerrero; type from Acaponeta, Tepic.

Stems glabrous, glaucescent; leaflets ovate to elliptic, 3 to 6 cm. long, acuminate, coarsely serrate, pale beneath, pilosulous when young but soon glabrate; cymes long-pedunculate, loose and open; seeds 2 or 3.

This was described originally as having twice or thrice ternate leaves, an error arising from the fact that a branch was mistaken for the rachis of a leaf.

DOUBTFUL SPECIES.

AMPELOPSIS ? DENUDATA Planch. in DC. Monogr. Phan. 5: 619. 1887. Type from Xochicalco, Mexico.

93. ELAEOCARPACEAE. Elaeocarpus Family.

Trees; leaves alternate or subopposite, simple; flowers perfect, 4 or 5-parted; sepals valvate; petals present or absent; stamens numerous; fruit baccate or capsular.

Fruit baccate; petals present ..... 1. **MUNTINGIA.**
Fruit capsular; petals none ..... 2. **SLOANEA.**

1. MUNTINGIA L. Sp. Pl. 509. 1753.

1. **Muntingia calabura** L. Sp. Pl. 509. 1753.

Guerrero to Veracruz, Yucatán, and Chiapas. West Indies, Central America, and northern South America; type from Jamaica.

Small tree, 6 to 10 meters high; leaves alternate, lance-oblong, 6 to 14 cm. long, acuminate, oblique at base, 3-nerved, dentate, glabrate above, tomentose beneath; flowers white, perfect, the long pedicels solitary or fasciculate in the leaf axils; sepals 5; petals 5, about 1 cm. long; stamens numerous, free; fruit baccate, globose, about 1 cm. in diameter, glabrous, many-celled. "Capulín" (Tabasco, Yucatán, Oaxaca, Veracruz, Guerrero, Costa Rica, Guatemala, El Salvador, Nicaragua); "capolín" (Yucatán); "jonote" (Oaxaca); "bersilana" (Chiapas); "puan" (Veracruz, *Palmer*); "palman" (Puebla, *Ramírez*); "capulí" (Cuba, El Salvador); "capulina," "memizo," "guácima cerezo" (Cuba); "chitotó," "manguito," "acurucó," "chirriador," "majagüito" (Colombia); "mahaujo" (Colombia, Venezuela); "datiles," "ratiles" (Philippines, the latter a Tagalog corruption); "cedrillo," "majagua" (Venezuela); "memiso" (Santo Domingo).

The tree has become naturalized in Siam and the Philippines. The bark contains a tough fiber which is used in tropical America for making rope and twine. The fruit is edible; it is yellow or red and very sweet. Descourtilz ascribes antispasmodic properties to the flowers.

2. SLOANEA L. Sp. Pl. 512. 1753.

1. **Sloanea mexicana** Standl., sp. nov.

Type from La Siberia, Michoacán or Guerrero, altitude 1,000 meters (*Langlassé* 980; U. S. Nat. Herb. no. 386311).

Tree, 15 to 20 meters high, with yellow flowers; branchlets densely tomentulose; petiole 9 cm. long, tomentulose; leaf blades (only one seen) elliptic, 35 cm. long, 17.5 cm. wide, subcordate at base, subacute at apex, thin, sinuate toward the apex, glabrous except on the veins, there puberulent, the venation prominent beneath; flowers in axillary racemes, these about 7-flowered, tomentulose, the stout pedicels 0.5 to 2.5 cm. long; sepals 5 to 8, oblong, or ovate-oblong, obtuse or acutish, tomentulose, 5 to 7 mm. long; stamens very numerous, longer than the calyx, puberulent; anthers linear-lanceolate, less than half as long as the filaments; ovary 4-celled, densely pilose.

Several species of *Sloanea* have been reported from Central America, but none of them agree with the Mexican specimens.

94. TILIACEAE. Linden Family.

Trees or shrubs; leaves alternate, simple, sometimes lobate, stipulate, commonly deciduous; pubescence mostly of branched hairs; flowers usually perfect; sepals 5, rarely 3 or 4, free or coherent, commonly valvate; petals as many as the sepals, or wanting; stamens usually numerous; fruit 2 to 10-celled, or by abortion 1-celled, dry or drupaceous, dehiscent or indehiscent.

Peduncle adnate to a bract; fruit nutlike ..... 1. **TILIA.**
Peduncle not adnate to a bract; fruit not nutlike.
  Fruit unarmed.
    Fruit silique-like, long and slender; flowers small ..... 2. **CORCHORUS.**
    Fruit a thick broad capsule; flowers large.
      Capsule thin, compressed, bivalvate ..... 3. **BELOTIA.**
      Capsule hard and woody, 5-angled, 5-valvate ..... 4. **LUEHEA.**
  Fruit armed with spines or bristles.
    Anthers linear; fruit depressed ..... 5. **APEIBA.**
    Anthers short; fruit not depressed.
      Fruit compressed, bivalvate, radiately bristly along the edges. 6. **HELIOCARPUS.**
      Fruit not compressed, usually indehiscent, covered on all sides with spines ..... 7. **TRIUMFETTA.**

1. **TILIA** L. Sp. Pl. 514. 1753.

Trees, the pubescence of simple or stellate hairs; leaves usually obliquely cordate, serrate; flowers white or yellowish, in axillary or terminal cymes, the peduncle winged with a large, foliaceous, partly adnate bract; sepals distinct; fruit globose, nutlike, indehiscent, 1 or 2-seeded.

The English names applied to species of *Tilia* are "linden" and "basswood." The trees are excellent shade trees and are often planted for this purpose. They are well adapted to street planting. The wood is light brown, soft, and light, with a specific gravity of 0.40 to 0.45. It is employed extensively for construction purposes, furniture, carriages, woodenware, and paper pulp. The tough fiber of the bark is sometimes utilized for cordage and rough mats. The sap is said to contain considerable sugar. The sweet-scented flowers yield an excellent quality of honey. The bark and leaves in water give a mucilaginous infusion. The flowers of *T. europaea* L. are official in the German Pharmacopoeia. They contain a colorless fragrant volatile oil, and are employed as a remedy for hysteria and indigestion.

Leaves glabrous beneath except sometimes in the axils of the veins.
  Leaves barbate beneath in the axils of the veins ..... 1. **T. floridana.**
  Leaves entirely glabrous beneath ..... 2. **T. mexicana.**
Leaves finely or coarsely stellate-tomentose beneath.
  Tomentum of the lower leaf surface loose and spreading, especially along the veins, brownish ..... 3. **T. occidentalis.**
  Tomentum fine, close, and grayish ..... 4. **T. houghi.**

1. **Tilia floridana** Small, Fl. Southeast. U. S. 761, 1335. 1903.

Chihuahua, Coahuila, and Nuevo León. Southeastern United States; type from Florida.

Leaves 7 to 12 cm. long, 5 to 7.5 cm. wide, short-acuminate, serrate with abruptly mucronate teeth, the lower surface at first with a few scattered stellate hairs but soon glabrous; bracts long-pedunculate; petals 6 to 7 mm. long; fruit about 8 mm. long, densely tomentulose.

The Mexican specimens have been determined by Dr. C. S. Sargent. One specimen from Nuevo León (*Pringle* 10188) was distributed as a new species.

2. **Tilia mexicana** Schlecht. Linnaea **11**: 377. 1837.

Known only from the type locality, Cuesta Grande de Chiconquiaco, Veracruz.

Leaves very oblique at base, not cordate, 10 cm. long and 6 cm. wide or smaller, short-acuminate, with very acute gland-tipped teeth.

The writer has seen no material agreeing with the original description, in which the lack of pubescence upon the leaves is emphasized. Most Mexican specimens of *Tilia* have been referred previously to this species.

3. Tilia occidentalis Rose, Contr. U. S. Nat. Herb. **8**: 317. 1905.

Michoacán and Guerrero; type from mountains near Pátzcuaro, Michoacán.

Leaves 7 to 15 cm. long (on young shoots as much as 23 cm.), 5.5 to 11 cm. wide, abruptly short-acuminate, obliquely truncate to cordate at base, glabrous above, loosely tomentose beneath or in age glabrate; bracts sessile or short-pedunculate; petals 6 to 7 mm. long; fruit about 6 mm. long. "Sirimo," "tirimo" (Michoacán).

4. Tilia houghi Rose, Contr. U. S. Nat. Herb. **8**: 318. 1905.

Michoacán to Oaxaca, Hidalgo, and Veracruz; type from Cuernavaca, Morelos.

Leaves 6 to 16 cm. long, 4.5 to 12 cm. wide, abruptly short-acuminate, obliquely truncate to cordate at base, bright green and glabrate above, densely and persistently tomentulose beneath; bracts sessile or pedunculate; petals 6 to 7 mm. long; fruit about 7 mm. in diameter, densely tomentulose. "Tilo" (Valley of Mexico); "sirimo" or "cirimo" (Valley of Mexico, Oaxaca); "yaca" (Oaxaca).

A *Tilia* has been reported from Jalisco by Oliva, and is probably of this species. The plant is employed in Mexico as a substitute for the European *T. europaea*. A decoction of the leaves is used to heal wounds and as a remedy for rheumatism.

2. CORCHORUS L. Sp. Pl. 529. 1753.

Herbs or shrubs, with mostly simple hairs; leaves serrate; flowers axillary or opposite the leaves, the peduncles mostly 1-flowered; flowers small, yellow; fruit a capsule, elongate and silique-like, 2 to 5-celled, many-seeded.

The species are essentially herbs, but they sometimes persist and become suffrutescent. *C. capsularis* L. and *C. olitorius* L. of the Old World tropics furnish the jute fiber of commerce.

Capsules strongly compressed, 2-horned at apex ..... **1. C. siliquosus.**
Capsule only slightly compressed, acuminate at apex, not 2-horned.
  Capsules erect-ascending, straight ..... **2. C. orinocensis.**
  Capsules spreading, curved ..... **3. C. hirtus.**

1. Corchorus siliquosus L. Sp. Pl. 529. 1753.

Reported from Yucatán and Tabasco. Texas, West Indies, Central America, and northern South America.

Plants herbaceous or woody, often 1 meter high, the stems pilosulous or glabrate; leaves short-petiolate, ovate, lance-ovate, or obovate, 0.5 to 2.5 cm. long, obtuse or acute, crenate-dentate, glabrous; petals 5 mm. long; capsules 4 to 5 mm. long. "Té de perla" (El Salvador); "escoba blanca" (Porto Rico); "malva té" (Cuba, Porto Rico); "té" (Panama).

The leaves are sometimes employed as a substitute for Chinese tea.

2. Corchorus orinocensis H. B. K. Nov. Gen. & Sp. **5**: 337. 1821.

Yucatán and probably elsewhere. Arizona, West Indies, and South America.

Stems puberulent or glabrate; leaves narrowly lanceolate to ovate, 3.5 to 6 cm. long, usually long-acuminate, crenate, glabrous; petals about 8 mm. long; capsules 3.5 to 5 cm. long.

3. Corchorus hirtus L. Sp. Pl. ed. 2. 747. 1762.

Corchorus pilolobus Link, Enum. Pl. **2**: 72. 1822.

Sinaloa and Tepic and probably elsewhere. West Indies, Central America, and South America.

Stems pilosulous or glabrate; leaves ovate to narrowly lanceolate, 1.5 to 5.5 cm. long, acute or acuminate, crenate, glabrous; capsules 3 to 5 cm. long. "Malva té" (Porto Rico).

3. BELOTIA A. Rich. in Sagra, Hist. Cuba **9**: 207. 1845.

Trees or shrubs; leaves 3-nerved, serrate; flowers in terminal panicles and lateral cymes; sepals distinct; capsule 2-celled, obcompressed; seeds long-ciliate.

Leaves covered beneath with a very fine and dense, grayish, closely appressed tomentum, sometimes also stellate-pilosulous.....**1. B. grewiaefolia.**
Leaves loosely stellate-pilosulous beneath but without tomentum. **2. B. mexicana.**

1. Belotia grewiaefolia A. Rich. in Sagra, Hist. Cuba **9**: 207. *pl. 21.* 1845.

Belotia galeottii Turcz. Bull. Soc. Nat. Moscou **19**: 504. 1846.

Veracruz and Oaxaca. Guatemala and Cuba; type from Cuba.

Tree, 9 to 24 meters high; leaves ovate-oblong to oblong-elliptic, 8 to 18 cm. long, acuminate, rounded at base, serrulate, green above and finally glabrate; sepals 6 to 10 mm. long; fruit 1 to 2 cm. long and somewhat broader, stellate-pilose. "Yaco de venado," "patita" (Oaxaca); "jonote coyolillo" (Veracruz); "guacimilla," "majagüilla blanca," "majagüilla macho" (Cuba).

It is probably this species which is reported from Tabasco as "palencano." The wood is said to be soft, but it is used for rafters and other objects. The tough fiber of the bark is employed for cordage.

2. Belotia mexicana (DC.) K. Schum. in Engl. & Prantl, Pflanzenfam. 3[6]: 28. 1890.

Grewia mexicana DC. Prodr. **1**: 510. 1824.

? *Belotia insignis* Baill. Adansonia **10**: 182. 1872.

Tepic to Oaxaca.

Tree, 5 to 6 meters high; leaves lance-oblong to broadly elliptic, 7 to 18 cm. long, obtuse or acute, velutinous or in age glabrate on the upper surface, serrulate; flowers purplish, the sepals 10 to 12 mm. long; fruit about 2 cm. long and 2.5 cm. wide, densely pilose. "Yaco de cal," "yaco venado" (Oaxaca).

It is perhaps this species which is reported from Chiapas by Ramírez with the vernacular name "capulincillo," but that name (which would indicate a fleshy fruit) is scarcely applicable to a plant of this genus.

4. LUEHEA Willd. Ges. Naturf. Freund. Berlin Neue Schrift. **3**: 410. 1801.

Shrubs or trees; leaves dentate, 3 or 5-nerved; flowers large and showy, white, in axillary cymes, the calyx subtended by numerous bractlets; sepals 5; capsule large, woody, 5-celled, usually 5-angulate, many-seeded.

Bractlets linear, finely pilosulous within; fruit obtusely angulate. **1. L. speciosa.**
Bractlets lanceolate or linear-lanceolate, pilose-barbate within along the costa; fruit acutely angulate.....**2. L. candida.**

1. **Luehea speciosa** Willd. Ges. Naturf. Freund. Berlin Neue Schrift. **3**: 410. 1801.

Luehea platypetala A. Rich. in Sagra, Hist. Cuba **9**: 212. *pl. 23.* 1845.

Luehea scabrifolia Presl, Epim. Bot. 212. 1849.

Veracruz, Yucatán, Campeche, and Oaxaca. Cuba, Central America, and South America.

Shrub or tree, 2 to 15 meters high; leaves short-petiolate, elliptic to oval or elliptic-ovate, 10 to 22 cm. long, abruptly acuminate, cordate or rounded at base, green and scabrous above, pale-tomentulose beneath, serrate; petals 2.5 to 4.5 cm. long; capsule 3 to 4 cm. long, densely pubescent. "Pepe cacao" (Campeche); "kazcat," "chacah" (Yucatán, Maya); "guácimo" (Panama); "guácimo macho" (Costa Rica); "pataxtillo" (Tabasco); "tablón" (Colombia); "guácima amarilla," "guácima varía," "guácima baría" (Cuba).

2. **Luehea candida** (DC.) Mart. Nov. Gen. & Sp. **1**: 102. 1824.

Alegria candida DC. Prodr. **1**: 517. 1824.

Luehea mexicana Spach; Steud. Nom. Bot. ed. 2. **2**: 77. 1841.

Luehea endopogon Turcz. Bull. Soc. Nat. Moscou **31**[1]: 225. 1858.

Sinaloa to Chiapas. Central America and Colombia.

Tree, 4 to 6 meters high; leaves broadly elliptic or ovate-elliptic, 10 to 20 cm. long, acute or abruptly acuminate, rounded or cordate at base, serrate, scabrous above, tomentulose beneath; petals 5 to 5.5 cm. long, 3 to 4 cm. wide; capsule 5 to 6 cm. long, glabrate in age. "Pataxte," "patazte" (Oaxaca); "algodoncillo" (Michoacán, Guerrero); "molenillo" (Nicaragua, Costa Rica); "guácimo molenillo" (Costa Rica).

In Central America the dry fruit, deprived of its seeds, is fastened to the end of a stick and used to beat chocolate, thus making the beverage light and frothy.

5. APEIBA Aubl. Pl. Guian. 1: 538. 1775.

1. **Apeiba tibourbou** Aubl. Pl. Guian. **1**: 538, *pl. 213.* 1775.

Veracruz and Oaxaca. West Indies; Central and South America.

Tree, 6 to 7 meters high, with flat spreading crown; leaves short-petiolate, elliptic-oval or elliptic-ovate, 10 to 30 cm. long, acute or short-acuminate, cordate at base, 5-nerved, crenulate, stellate-hirtellous; flowers yellowish, in lateral cymes; sepals free; petals about 1.5 cm. long; fruit depressed-globose, 8 to 10 cm. in diameter, coriaceous, pulpy within, very densely covered with long stout hairy spines. "Peine de mico" (Veracruz, Oaxaca, Costa Rica, Panama); "burillo" (Nicaragua); "heriso," "erizo" (Colombia, Venezuela); "malagano" (Colombia); "cabeza de negro" (Guiana).

The bark fiber is said to be used in some localities for making coarse rope. The leaves and bark are mucilaginous, and antispasmodic properties are ascribed to the flowers.

6. HELIOCARPUS L. Sp. Pl. 448. 1753.

Trees or shrubs, the pubescence of stellate hairs; leaves often trilobate; flowers small, the small cymes arranged in a terminal panicle; sepals 4, distinct; petals 4; stamens numerous; fruit capsular, subglobose or subclavate, 2-celled, slightly compressed, the edge surrounded by a row of radiating plumose bristles.

Many of the Mexican species are imperfectly known, the fruit being lacking in some cases and the flowers in others. The differences between the species, moreover, are not sharply marked.

Besides the vernacular names listed under the species, the following additional ones are reported for plants whose specific identity is doubtful: "Coche"

(Sinaloa); "cuaulahuac" (Veracruz); "jolocín blanco" (Tabasco); "cuaulote," "xolotzin" (various parts of Mexico); "burillo falso" (Nicaragua); "calagüe," "calagua," "calagual" (El Salvador); "tolotzin," "catena" (Tabasco); "copal" (Veracruz); "majahua" (Jalisco); "yaga-guiehi" (Oaxaca, Zapotec, *Reko*).

The wood of these trees is soft and light, and is employed for floats and bottle stoppers. In Brazil paper has been made from it. In Mexico a kind of paper was formerly made from the bark by beating it into thin sheets. The bark of young branches is tough and is often used as a substitute for cordage, or sometimes coarse rope and twine is made from it. The pulverized bark, or a decoction of it, is sometimes applied to sores.

Fruit borne on a long bristly stipe.
- Leaf blades with stipule-like appendages at base_____1. **H. appendiculatus.**
- Leaf blades not appendaged.
  - Leaves densely tomentose or stellate-pilose beneath, with loose spreading hairs_____2. **H. tomentosus.**
  - Leaves glabrate beneath, sparsely pilose, or covered with a minute close tomentum.
    - Leaf blades as broad as long or nearly so_____3. **H. tigrinus.**[1]
    - Leaf blades much longer than broad.
      - Leaves glabrous or nearly so_____4. **H. glabrescens.**[1]
      - Leaves covered beneath with minute stellate hairs. 5. **H. donnell-smithii.**

Fruit sessile or nearly so.
- Leaves covered beneath with a pale close minute tomentum.
  - Leaves about as broad as long_____6. **H. velutinus.**
  - Leaves much longer than broad_____7. **H. pallidus.**
- Leaves glabrous beneath or with pubescence of coarse spreading hairs.
  - Calyx lobes not appendaged_____8. **H. terebinthaceus.**
  - Calyx lobes appendaged at apex.
    - Leaves glabrous or glabrate beneath, or with scattered stellate hairs.
      - Body of the fruit elliptic-oblong_____9. **H. glanduliferus.**
      - Body of the fruit suborbicular.
        - Leaves about as broad as long, shallowly lobed_____3. **H. tigrinus.**
        - Leaves much longer than broad, not lobed.
          - Leaves cordate at base_____10. **H. polyandrus.**
          - Leaves rounded or cuneate at base_____11. **H. occidentalis.**
    - Leaves densely stellate-tomentose beneath.
      - Leaves nearly or quite as broad as long, usually lobed. 12. **H. reticulatus.**
      - Leaves about twice as broad as long, not lobed.
        - Sepals 4.5 mm. long, with erect appendages_____13. **H. attenuatus.**
        - Sepals 2 to 3 mm. long, with spreading appendages. 14. **H. palmeri.**

1. **Heliocarpus appendiculatus** Turcz. Bull. Soc. Nat. Moscou 31[1]: 226. 1858.

San Luis Potosí, Veracruz, Chiapas, and Tabasco; type from Teapa, Tabasco.

Shrub or tree, sometimes 7.5 meters high; leaves ovate to orbicular, 10 to 20 cm. long, acute or acuminate, usually not lobed, dentate, stellate-tomentose beneath; sepals 5 to 6 mm. long, not appendaged; fruit (including bristles) 10 to 14 mm. wide, very hairy. "Majagua" (Chiapas); "burío" (Costa Rica).

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[1] The fruit is not known in these species.

2. **Heliocarpus tomentosus** Turcz. Bull. Soc. Nat. Moscou **31**[1]: 225. 1858.

Puebla, Oaxaca, and Veracruz; type from Mirador, Veracruz.

Shrub or tree, 4.5 to 9 meters high; leaves large, broadly ovate, acute or acuminate, cordate at base, not lobed; flowers yellowish white, the sepals about 5 mm. long, not appendaged; fruit (and bristles) 7 to 8 mm. wide. "Jonote" (Veracruz).

This, like some other species, has been reported from Mexico as *H. americanus* L.

3. **Heliocarpus tigrinus** Hochr. Ann. Cons. Jard. Genève **18–19**: 123. 1914.

Known only from the type locality, Moreno, Michoacán, altitude 450 meters.

Shrub, 4.5 meters high, with glabrous stems; leaves 5 to 15 cm. long, sharply serrate, cordate at base, green, thinly pilose beneath; flowers yellowish green, the sepals 5 mm. long; fruit not known.

4. **Heliocarpus glabrescens** Hochr. Ann. Cons. Jard. Genève **18–19**: 122. 1914.

Known only from the original collection, from the cordillera of Veracruz, altitude 1,000 meters.

Branches glabrous; leaves ovate, 5 to 11 cm. long, long-acuminate, rounded at base, glabrous but penicillate beneath in the axils of the nerves, dentate; sepals 6 mm. long; fruit not known.

5. **Heliocarpus donnell-smithii** Rose, Bot. Gaz. **31**: 110. *pl. 1.* 1901.

Heliocarpus caeciliae Loesener, Repert. Sp. Nov. Fedde **12**: 227. 1913.

Veracruz and Tabasco. Guatemala and Nicaragua; type from Arenal, Guatemala.

Tree, 7 to 9 meters high; branches sparsely stellate-pilose; leaves ovate or lance-ovate, 6 to 15 cm. long, acuminate, subcordate at base, serrulate; fruit 10 to 12 mm. broad. "Jolocín" (Tabasco).

6. **Heliocarpus velutinus** Rose, Contr. U. S. Nat. Herb. **8**: 317. 1905.

Known only from the type locality, limestone hills near Yautepec, Morelos, altitude 1,350 meters.

Small tree; leaves long-petiolate, about 15 cm. long, shallowly trilobate, cordate at base, crenate, green and glabrate above; fruit 5 to 6 mm. broad, the bristles shorter than the diameter of the body.

7. **Heliocarpus pallidus** Rose, Contr. U. S. Nat. Herb. **5**: 128. *pl. 10.* 1897.

Known only from the type locality, Acapulco, Guerrero.

Shrub or tree, 3.5 to 7.5 meters high, the branches minutely stellate-tomentulose; leaves broadly ovate, 5 to 10 cm. long, sometimes shallowly lobate, long-acuminate, serrate, rounded at base; sepals 6 mm. long; fruit about 10 mm. broad.

8. **Heliocarpus terebinthaceus** (DC.) Hochr. Ann. Cons. Jard. Genève **18-19**: 125. 1914.

Grewia terebinthacea DC. Cat. Hort. Monsp. 114. 1813.

Heliocarpus nelsoni Rose, Contr. U. S. Nat. Herb. **5**: 128. 1897.

Heliocarpus laevis Rose, Contr. U. S. Nat. Herb. **8**: 317. 1905.

Jalisco to Oaxaca.

Shrub or small tree, 2.5 to 6 meters high, the branches stellate-tomentose; leaves large, cuspidate-acuminate, dentate, stellate-tomentose on both surfaces; sepals 4 to 5 mm. long; fruit densely covered with plumose bristles. "Jonote" (Oaxaca).

9. **Heliocarpus glanduliferus** Robinson; Rose, Contr. U. S. Nat. Herb. **5**: 127. 1897.

Veracruz and Chiapas. Central America; type from Santa María, Guatemala.

Tree, about 6 meters high; leaves broadly ovate to ovate-oblong, long-acuminate, stellate-pubescent and glandular beneath, crenate-serrate; sepals 5 to 6 mm. long; fruit body 6 to 7 mm. long, glandular, the margin fringed with plumose bristles. "Calagüe" (El Salvador).

10. Heliocarpus polyandrus S. Wats. Proc. Amer. Acad. **21**: 420. 1886.

Heliocarpus glaber T. S. Brandeg. Zoe **5**: 209. 1905

Chihuahua, Sonora, and Sinaloa; type from Hacienda San Miguel, southwestern Chihuahua.

Shrub, 3 meters high; leaves broadly ovate, 7 to 13 cm. long, acute or acuminate, crenate, nearly glabrous; sepals 4 to 5 mm. long; fruit 5 to 6 mm. wide, the bristles short.

11. Heliocarpus occilentalis Rose, Contr. U. S. Nat. Herb. **5**: 127. *pl. 8.* 1897.

Colima and Guerrero; type from Acapulco, Guerrero.

Shrub or tree, 4.5 to 9 meters high, the trunk 7.5 to 12 cm. in diameter; leaves broadly ovate or lance-ovate, acuminate, crenate; fruit about 12 mm. broad, the bristles much longer than the body.

12. Heliocarpus reticulatus Rose, Contr. U. S. Nat. Herb. **5**: 128. *pl. 9.* 1897.

Heliocarpus microcarpus Rose, Contr. U. S. Nat. Herb. **8**: 316. 1905.

Zacatecas, Durango, and Jalisco to Morelos and Chiapas; type from Guadalajara, Jalisco. Guatemala.

Shrub or tree, 3 to 8 meters high, the branches stellate-tomentose; leaves large, long-petiolate, cuspidate-acuminate, cordate at base, serrate, tomentose on both surfaces; sepals 5 to 6 mm. long; fruit 6 to 12 mm. broad, very hairy. "Quauhalagua" or "cuahualagua" (Morelos, Puebla); "jolotzín" (Morelos).

13. Heliocarpus attenuatus S. Wats. Proc. Amer. Acad. **21**: 420. 1886.

Chihuahua, Sonora, and Sinaloa; type from Hacienda San Miguel, southwestern Chihuahua.

Shrub or tree, 2.5 to 12 meters high, the trunk sometimes 25 to 30 cm. in diameter, the branchlets tomentose; leaves ovate, 5 to 12 cm. long, long-acuminate, cordate at base. "Zamo baboso" (Sinaloa).

14. Heliocarpus palmeri S. Wats. Proc. Amer. Acad. **21**: 420. 1886.

Known only from the type locality, Hacienda San Miguel, southwestern Chihuahua.

Shrub, 2.5 to 3 meters high, the branches closely tomentose; leaves ovate, 7 to 15 cm. long, long-acuminate, rounded or subcordate at base, crenate-serrate.

7. TRIUMFETTA L. Sp. Pl. 444. 1753.

Shrubs or sometimes herbs, with stellate pubescence; leaves often 3 or 5-lobate; flowers small or large, yellow, axillary or opposite the leaves, fasciculate-cymulose; sepals 5, appendaged at apex; petals 5, rarely absent; stamens 10 to many; fruit subglobose, 2 to 5-celled, indehiscent or separating into 2 to 5 cocci, covered with short or long spines, each of these uncinate at apex.

The fruits adhere readily to cothing and other objects by their hooked spines. The inner bark of all species yields a strong fiber, resembling jute, which is suitable for the manufacture of cordage.

The plants are said to have received the name "paroquet-bur" in Jamaica, because parokets feed on the ripe fruit. The names "jonote," "cajete" (Chiapas), and "güizapol de borrego" (Jalisco) are reported for Mexican plants of the genus, whose specific identity is uncertain.

Spines of the fruit retrorsely barbate.
- Petals none; gynophore very short, without glands ---------- **1. T. lappula.**
- Petals present; gynophore somewhat elongate, with 5 glands at base.
  - Upper surface of leaves densely stellate-pubescent ------ **2. T. semitriloba.**
  - Upper surface of leaves pilose with long, mostly simple hairs. **3. T. dumetorum.**

Spines of the fruit glabrous, puberulent, or pilose with long spreading hairs.
- Calyx 20 to 35 mm. long, or sometimes larger.
  - Petals less than half as long as the sepals and concealed by them. **4. T. speciosa.**
  - Petals nearly as long as the sepals, conspicuous.
    - Leaves ovate or broadly rhombic, long-petiolate, broadest at or near the base.
      - Petiole with large glands at apex; leaves broadly rhombic; petals 5 to 6 mm. wide ---------- **5. T. coriacea.**
      - Petiole without glands; leaves ovate or lance-ovate; petals 2 mm. wide.
        - Petals densely long-pilose at base ---------- **6. T. columnaris.**
        - Petals very sparsely and minutely stellate-pubescent at base. **7. T. chihuahuensis.**
    - Leaves oblong to rounded-obovate, short-petiolate or sessile, broadest at or above the middle.
      - Sepals with very short thick appendages; leaves minutely stellate-pubescent on the upper surface ---------- **8. T. cucullata.**
      - Sepals with long slender appendages; leaves coarsely stellate-pubescent on the upper surface.
        - Sepals 2.8 to 3.5 cm. long ---------- **9. T. polyandra.**
        - Sepals 2 cm. long ---------- **10. T. obovata.**
- Calyx 6 to 18 mm. long.
  - Petals none ---------- **11. T. apetala.**
  - Petals present.
    - Fruit dehiscent ---------- **12. T. dehiscens.**
    - Fruit (so far as known) indehiscent.
      - Appendages of the sepals 3.5 to 5 mm. long ---------- **13. T. falcifera.**
      - Appendages less than 3 mm. long.
        - Leaves glabrous, or the pubescence of the upper surface chiefly or wholly of simple hairs.
          - Leaves glabrous except for tufts of hairs beneath in the axils of the veins ---------- **14. T. mexicana.**
          - Leaves pubescent on one or both surfaces.
            - Spines nearly or quite as long as the body of the fruit, slender; leaves broadly ovate, slender-cuspidate -- **15. T. grandiflora.**
            - Spines very short, stout; leaves ovate-lanceolate, acuminate. **16. T. goldmanii.**
        - Leaves copiously stellate-pubescent or tomentose on both surfaces.
          - Petioles short and stout, usually less than 1 cm. long, the upper leaves mostly sessile.
            - Upper leaves sessile; stamens usually 15 -------- **17. T. palmeri.**
            - Upper leaves petiolate; stamens 25 to 30 -------- **18. T. brevipes.**
          - Petioles long and slender.
            - Sepals glabrous or glabrate ---------- **19. T. acracantha.**
            - Sepals stellate-pilose.
              - Spines of the fruit few, much thickened below. **20. T. socorrensis.**

Spines numerous, very slender.
Petals half as long as the sepals or shorter.
21. T. galeottiana.
Petals nearly as long as the sepals.....22. T. discolor.

1. Triumfetta lappula L. Sp. Pl. 444. 1753.

Morelos, Oaxaca, and probably elsewhere. West Indies, Central America, and western Africa.

Slender shrub, 1.5 to 3 meters high; leaves long-petiolate, ovate or rhombic, often trilobate, dentate, acute or acuminate, finely stellate-pubescent; sepals 3 to 4 mm. long, densely tomentose; fruit (including spines) 6 to 8 mm. in diameter, stellate-pubescent, the spines slender. "Mozote de caballo" (Costa Rica, Nicaragua); "pega-pega" (Panama); "cadillo" (Porto Rico); "mata de negro" (Santo Domingo).

The bark furnishes a fine and strong fiber. The leaves and bark contain a sweet, slightly astringent mucilage, and an infusion is used in Costa Rica as a remedy for colds. The plant is used also to purify or clarify syrup, in making native sugar.

2. Triumfetta semitriloba Jacq. Enum. Pl. Carib. 22. 1760.

? *Triumfetta althaeoides* Lam. Encycl. **3**: 420. 1789.

Sinaloa to Tamaulipas, Yucatán, and Chiapas. West Indies, Central America, and South America.

Slender shrub, 1 to 3 meters high; leaves ovate to rhombic, long-petiolate, acute or acuminate, rounded or cordate at base, often shallowly lobed; sepals 5 to 7 mm. long; petals yellow, about equaling the sepals; fruit 6 to 8 mm. in diameter, the body glabrate in age, the spines slender. "Majalmilla," "majahuilla" (Sinaloa); "cadillo" (Tabasco, Veracruz, Porto Rico, Colombia); "ochmul" (Yucatán); "abrojo" (Colima); "huizapotillo" (Jalisco, *Urbina*); "cadillo malva" (Tamaulipas); "guizazo," "guizazo de cochino" (Cuba); "escobilla amarilla" (Guatemala).

Like the other species, this plant has tough fiber, which has been used for making rope, coarse cloth, and, in Brazil, paper. The roots are mucilaginous and astringent, and they are said to have diuretic properties. Locally they are administered for venereal diseases and for liver and kidney affections.

3. Triumfetta dumetorum Schlecht. Linnaea **11**: 377. 1837.

Triumfetta lindeniana Turcz. Bull. Soc. Nat. Moscou **31**[1]: 229. 1858.

Triumfetta botteriana Turcz. Bull. Soc. Nat. Moscou **32**[1]: 260. 1859.

Veracruz and Oaxaca; type from Jalapa, Veracruz. Guatemala.

Shrub, 1 to 2 meters high; leaves long-petiolate, broadly ovate to oblong-lanceolate, acuminate, rounded or obtuse at base, sometimes lobate, duplicate-serrate, green beneath and thinly stellate-hirsute; calyx 6 to 8 mm. long, often glabrate; petals equaling the sepals, yellow; fruit 8 to 10 mm. in diameter, with very slender spines.

It is not improbable that some earlier name, based upon a West Indian or South American plant, may be found for this species.

4. Triumfetta speciosa Seem. Bot. Voy. Herald 86. 1853.

Triumfetta macrocalyx Turcz. Bull. Soc. Nat. Moscou **31**[1]: 230. 1858.

Triumfetta micropetala Hochr. Ann. Cons. Jard. Genève **18–19**: 98. 1914.

Veracruz, Oaxaca, and Chiapas. Central America; type from Boquete, Panama.

Shrub, 1 to 2 meters high; leaves long-petiolate, usually 3-lobate, acute or acuminate, rounded or subcordate at base, serrulate, densely tomentose beneath; sepals red, 3 to 4 cm. long, hirsute, with slender appendages; fruit 1 to 2 cm. in diameter, the spines slender, usually very hairy.

5. **Triumfetta coriacea** Hochr. Ann. Cons. Jard. Genève **18–19**: 108. 1914.

Known only from the type locality, in the Sierra Madre of Michoacán or Guerrero, altitude 800 meters.

Shrub, 1.5 meters high; petiole with several large glands at the apex; leaves short-acuminate, rounded or cuneate at base, dentate, minutely tomentose beneath; sepals about 22 mm. long, with very short appendages; petals 2 cm. long, yellow.

6. **Triumfetta columnaris** Hochr. Ann. Cons. Jard. Genève **18–19**: 101. 1914.

Triumfetta pseudocolumnaris Hochr. Ann. Cons. Jard. Genève **18–19**: 103. 1914.

Oaxaca and Chiapas, and perhaps elsewhere; type from Totontepec.

Shrub; leaves 4 to 9 cm. long, long-acuminate, rounded or subcordate at base, serrate, villous-tomentose beneath; sepals about 2 cm. long, thinly stellate-pilose; petals linear, about as long as the sepals, densely pilose at base.

7. **Triumfetta chihuahuensis** Standl., sp. nov.

Chihuahua; type from Guayanopa Canyon in the Sierra Madre, altitude 1,500 meters (*M. E. Jones*, September 23, 1903; U. S. Nat. Herb. no. 855849).

Slender shrub; leaves long-petiolate, lanceolate to rounded-ovate, long-acuminate, rounded or subcordate at base, serrate, finely stellate-pubescent, green beneath, 5 or 7-nerved at base; sepals 20 to 22 mm. long, sparsely stellate-pubescent; petals linear-oblanceolate, shorter than the sepals, acute, glabrous except at base; fruit (including spines) 8 mm. in diameter, minutely puberulent, covered with slender spines.

8. **Triumfetta cucullata** Fernald, Bot. Gaz. **20**: 532. 1895.

Known only from the type locality, Zopilote, Tepic.

Petioles bearing several large glands; leaves mostly oblong-elliptic, 3-nerved, acute, obtuse or cuneate at base, glandular-serrulate, very rough; sepals 2.5 to 3 cm. long, stellate-tomentose; petals spatulate, nearly equaling the sepals.

9. **Triumfetta polyandra** DC. Prodr. **1**: 508. 1825.

Triumfetta insignis S. Wats. Proc. Amer. Acad. **22**: 400. 1887.

Sinaloa to Chiapas.

Leaves 3 or 5-nerved, oblong to oval or sometimes rounded, 7 to 15 cm. long, obtuse or acute, obtuse or subcordate at base, glandular-serrulate, tomentose beneath; sepals stellate-tomentose; petals oblanceolate, obtuse, yellow, about as long as the sepals; fruit 2.5 to 4 cm. in diameter, covered with very numerous slender plumose spines. "Pastora," "cadillo" "guachapure de la sierra (Sinaloa).

10. **Triumfetta obovata** Schlecht. & Cham. Linnaea **5**: 228. 1830.

Veracruz; type from Hacienda de la Laguna.

Branches and leaves densely tomentose; leaves obovate or rounded-obovate, acute or obtuse, shallowly cordate at base, serrulate, 3 or 5-nerved; calyx tomentose; fruit about 2 cm. in diameter, covered with long slender plumose spines.

It is doubtful whether this is distinct from *T. polyandra*. The writer has seen only a single specimen, but it appears to have decidedly smaller flowers than that species.

11. **Triumfetta apetala** Hochr. Ann. Cons. Jard. Genève **18–19**: 97. 1914.

Known only from the type locality, mountains of Oaxaca, altitude 1,300 to 1,600 meters.

Shrub; leaves ovate or ovate-lanceolate, 8 to 10 cm. long, long-petiolate, long-acuminate, dentate, stellate-pilose; sepals 4 mm. long; fruit 4 mm. in diameter, glabrous.

12. Triumfetta dehiscens Rose, Contr. U. S. Nat. Herb. **12**: 185. 1909.

Sonora and Sinaloa; type from Colomas, Sinaloa.

Shrub; leaves broadly ovate, acuminate, duplicate-serrate, gray-tomentose beneath, with glands at base of blade; flowers not known; fruit glabrate, 1 cm. in diameter, 5-celled, covered with very slender spines.

13. Triumfetta falcifera Rose, Contr. U. S. Nat. Herb. **12**: 285. 1909.

Michoacán and Guerrero; type from Acapulco, Guerrero.

Shrub, 2 meters high; leaves long-petiolate, lance-ovate to rhombic-ovate, cuspidate-acuminate, rounded or subcordate at base, serrate; sepals 7 to 8 mm. long, hirsute, the appendages entire or lobate; petals much shorter than the sepals, yellow; fruit about 1 cm. in diameter, covered with stout spines.

14. Triumfetta mexicana Turcz. Bull. Soc. Nat. Moscou **31**[1]: 230. 1858.

Adenodiscus mexicanus Turcz. Bull. Soc. Nat. Moscou **19**[2]: 504. 1846.

Veracruz and Oaxaca; type from mountains of Oaxaca.

Slender shrub; leaves slender-petiolate, broadly ovate, acuminate, serrate, 7-nerved at the rounded or subcordate base; sepals puberulent, 3 to 4 mm. long.

15. Triumfetta grandiflora Vahl, Eclog. Amer. **2**: 39. 1798.

Triumfetta longicuspis Turcz. Bull. Soc. Nat. Moscou **31**[1]: 229. 1858.

Oaxaca. Guatemala and West Indies.

Leaves long-petiolate, broadly ovate, cuspidate-acuminate, rounded or subcordate at base, glandular-serrate, in age glabrate; sepals glabrate, 15 to 18 mm. long; petals linear-oblanceolate, nearly as long as the sepals; fruit 1.5 cm. in diameter, glabrous, covered with very numerous slender spines.

16. Triumfetta goldmanii Rose, Contr. U. S. Nat. Herb. **12**: 285. 1909.

Sinaloa; type from Sierra de Choix.

Slender shrub, 1.5 meters high; leaves slender-petiolate, long-acuminate, sometimes shallowly trilobate, rounded at base, serrate; calyx 1.5 cm. long, sparsely and very minutely stellate-pubescent; petals linear, about as long as the sepals; fruit 5 to 6 mm. in diameter, the spines 1 to 2 mm. long. "Cadillo."

17. Triumfetta palmeri S. Wats. Proc. Amer. Acad. **22**: 400. 1887.

Durango and Jalisco; type from Río Blanco, Jalisco.

Shrub; leaves oblong, lance-oblong, or rhombic-lanceolate, acute, obtuse or rounded at base, serrate, coarsely stellate-pilose; sepals 12 mm. long, densely stellate-tomentose, with very short appendages; petals linear, shorter than the sepals; fruit 8 mm. in diameter, puberulent, covered with short stout spines.

18. Triumfetta brevipes S. Wats. Proc. Amer. Acad. **22**: 400. 1887.

Jalisco and Michocán; type from Río Blanco, Jalisco.

Shrub; leaves lance-oblong, acuminate, rounded at base, 5-nerved, coarsely serrate, tomentose beneath; sepals about 13 mm. long, stellate-tomentose; petals oblanceolate, obtuse, shorter than the sepals; fruit 8 to 10 mm. in diameter, glabrate in age, covered with short stout spines.

Doubtfully distince from *T. palmeri*.

19. Triumfetta acracantha Hochr. Ann. Cons. Jard. Genève **18–19**: 111. 1914.

Sinaloa to Guerrero; type from Baqueta.

Shrub, 1.5 meters high; leaves ovate or ovate-rhombic, long-acuminate, rounded or subcordate at base, duplicate-serrate, green and thinly stellate-pubescent beneath; sepals about 6 mm. long; petals 2.5 mm. long.

20. Triumfetta socorrensis T. S. Brandeg. Erythea **7**: 1. 1899.

Known only from Socorro Island, Baja California.

Shrub; leaves rounded-ovate, obtuse or acutish, subcordate at base, serrate, very densely tomentose; fruit 1.5 to 2 cm. in diameter, densely pilose.

21. **Triumfetta galeottiana** Turcz. Bull. Soc. Nat. Moscou **32**[1]: 260. 1859.

? *Triumfetta brachypetala* Turcz. Bull. Soc. Nat. Moscou **31**[1]: 227. 1858.

Jalisco to Veracruz and Chiapas; Turczaninow gives the type locality as "Oaxaca, alt. 3,000 ped.," but a specimen of the original collection (*Galeotti* 4153) in the National Herbarium is labeled as from "Bois de Zacuapan," Veracruz, at the same altitude.

Shrub, 1 to 2.5 meters high; leaves ovate to rounded-ovate, long-acuminate, rounded or subcordate at base, serrate, usually densely tomentose beneath; sepals 3 to 5 cm. long; fruit 6 to 8 mm. in diameter, usually glabrous, covered with slender spines.

22. **Triumfetta discolor** Rose, Contr. U. S. Nat. Herb. **12**: 285. 1909.

Durango; type collected between Pedro Paulo and San Blascito.

Shrub; leaves rounded, 2 to 7 cm. long, obtuse or rounded at apex, subcordate at base, serrate, gray-tomentose beneath, sometimes shallowly trilobate; sepals about 18 mm. long; petals linear-oblanceolate.

DOUBTFUL SPECIES.

TRIUMFETTA OLIGACANTHA Hochr. Ann. Cons. Jard. Genève **18–19**: 106. 1914. Based upon a specimen from either Peru or Mexico; related to *T. semitriloba*.

TRIUMFETTA ORIZABAE Turcz. Bull. Soc. Nat. Moscou **32**[1]: 261. 1859. Type from Orizaba.

TRIUMFETTA OXYPHYLLA DC. Prodr. **1**: 508. 1824. Described from Mexico.

TRIUMFETTA PANICULATA Hook. & Arn. Bot. Beechey Voy. 279. 1836–39. Type from Jalisco.

95. MALVACEAE. Mallow Family.

Shrubs or trees, or more often herbs, the pubescence usually of stellate hairs; leaves alternate, commonly palmate-nerved, simple or compound, stipulate; flowers axillary, racemose, or paniculate, usually perfect, the calyx often subtended by bractlets; sepals 5, more or less united; petals 5; stamens numerous, united to form a column; fruit usually dry, composed of several carpels, these verticillate about an axis, dehiscent or indehiscent, or the fruit sometimes capsular.

The plants of this family have mucilaginous juice. Many of them are employed in domestic medicine because of their emollient properties.

Fruit a loculicidal capsule; calyx subtended by bractlets.
- Bractlets at the base of the calyx 5 or more.
  - Cells of the fruit 1-ovulate ..... 16. **KOSTELETZKYA.**
  - Cells of the fruit containing 2 or more ovules ..... 17. **HIBISCUS.**
- Bractlets 3.
  - Capsule usually 5-celled ..... 18. **GOSSYPIUM.**
  - Capsule 3-celled.
    - Petals white, turning purplish; leaves usually lobed; bractlets longer than the calyx ..... 19. **THURBERIA.**
    - Petals purple; leaves entire; bractlets shorter than the calyx. 20. **ERIOXYLUM.**

Fruit not capsular, the carpels separating from each other and from the axis at maturity; or the fruit rarely capsular, but bractlets then absent.
- Style branches (10) twice as many as the carpels.
  - Carpels rough, often spine-armed, usually dry ..... 14. **MALACHE.**
  - Carpels smooth, unarmed, fleshy ..... 15. **MALVAVISCUS.**
- Style branches of the same number as the carpels.
  - Bractlets present at the base of the calyx.
    - Seeds 2 or more in each cell of the fruit ..... 11. **SPHAERALCEA.**

Seed 1 in each cell.
Bractlets connate ..... 12. **LAVATERA.**
Bractlets distinct ..... 13. **MALVASTRUM.**
Bractlets none at the base of the calyx.
Seeds 2 or more in each cell.
Carpels of the fruit winged.
Carpels each with a dorsal wing above, and with crests along the margins ..... 1. **BAKERIDESIA.**
Carpels each with 2 lateral wings ..... 2. **HORSFORDIA.**
Carpels not winged.
Carpels 1-celled.
Carpels each with 2 retrorse spines below ..... 3. **NEOBRITTONIA.**
Carpels without spines below ..... 4. **ABUTILON.**
Carpels imperfectly 2-celled.
Carpels usually 5, imperfectly 2-celled by the lateral constriction of their walls ..... 5. **WISSADULA.**
Carpels 5 to 11, a free partition projecting from the dorsal wall. 6. **PSEUDABUTILON.**
Seed 1 in each cell.
Fruit a loculicidal 5-celled capsule ..... 7. **BASTARDIA.**
Fruit of 5 or more carpels, these separating at maturity.
Dorsal wall of the carpels separating at maturity from the lateral walls ..... 8. **GAYA.**
Dorsal wall not separating from the lateral walls.
Carpels membranaceous, inflated at maturity. 9. **ROBINSONELLA.**
Carpels thick, not inflated ..... 10. **SIDA.**

1. **BAKERIDESIA** Hochr. Ann. Cons. Jard. Bot. Genève **15–16**: 298. 1913.

The following is the only known species of the genus.

1. **Bakeridesia galeottii** (Baker f.) Hochr. Ann. Cons. Jard. Genève **15–16**: 298. 1913.

Abutilon galeottii Baker f. Journ. Bot. Brit. & For. **31**: 73. 1893.

Described from Veracruz.

Stems woody; leaves petiolate, broadly ovate-cordate, 3 to 8 cm. long, acuminate, entire, puberulent; flowers axillary, solitary or geminate, long-pedunculate; calyx stellate-puberulent; corolla yellow, 2.2 cm. long; fruit of about 13 carpels, these each with a broad dorsal wing above, the margins sinuate-cristate.

2. **HORSFORDIA** A. Gray, Proc. Amer. Acad. **22**: 296. 1887.

Shrubs or large herbs, with stellate pubescence; peduncles axillary, 1-flowered, or sometimes paniculate; bractlets none; fruit of 8 to 12 coalescent carpels, these 1 to 3-seeded, the upper portion accrescent and developing 2 wings.

Leaves rounded-cordate, 1.5 to 2.5 cm. long, usually as broad as long. 1. **H. rotundifolia.**
Leaves cordate-ovate to lanceolate, mostly 3 to 7 cm. long, much longer than broad.
Leaves chiefly lanceolate; carpels 2 or 3-seeded ..... 2. **H. newberryi.**
Leaves ovate or broadly ovate; carpels 1-seeded ..... 3. **H. alata.**

1. **Horsfordia rotundifolia** S. Wats. Proc. Amer. Acad. **24**: 40. 1889.

Horsfordia purisimae T. S. Brandeg. Proc. Calif. Acad. II. **2**: 135. 1889.

Baja California and Sonora; type from Guaymas, Sonora.

Low shrub; leaves rounded or obtuse at apex, crenate, finely stellate-tomentose; flowers in naked panicles; petals yellow, 7 to 8 mm. long; carpels 6 to 8, 1-seeded.

2. **Horsfordia newberryi** (S. Wats.) A Gray, Proc Amer. Acad. **22**: 297. 1887.
Abutilon newberryi S. Wats. Proc. Amer. Acad. **11**: 125. 1876.
Sonora and Baja California. Southern Arizona and California; type collected on the lower Colorado River.
Shrub, 1 to 2.5 meters high, covered throughout with a very fine dense yellowish stellate tomentum; leaves attenuate, rounded or cordate at base, very thick, subentire; petals yellow, 8 mm. long; carpels 8 or 9.

3. **Horsfordia alata** (S. Wats.) A. Gray, Proc. Amer. Acad. **22**: 297. 1887.
Sida alata S. Wats. Proc. Amer. Acad. **20**: 356 1885.
Horsfordia palmeri S. Wats. Proc. Amer. Acad. **24**: 40. 1889.
Sonora and Baja California; type from northwestern Sonora.
Shrub, 1 to 3.5 meters high; leaves obtuse or acute, dentate or subentire, densely stellate-tomentose with somewhat viscid pubescence; petals pink, 1 to 1.5 cm. long; carpels 10 to 12. "Malva blanca" (Baja California).

3. NEOBRITTONIA Hochr. Ann. Cons. Jard. Bot. Genève **9**: 184. 1905.

The following is the only species known.

1. **Neobrittonia acerifolia** (Lag.) Hochr. Ann. Cons. Jard. Bot. Genève **9**: 184. 1905.
Sida acerifolia Lag. Gen. & Sp. Nov. 21. 1816.
Abutilon acerifolium Don, Hist. Dichl. Pl. **1**: 504. 1831.
Sida discissa Bertol. Mem. Soc. Ital. Moden. **23**: 305. 1844.
Abutilon discissum Schlecht. Linnaea **25**: 218. 1852.
Morelos. Guatemala; described from cultivated plants.
Plants 2 to 3 meters high, the stems pilose with very long soft spreading hairs; leaves 6 to 20 cm. long, deeply cordate at base, deeply 3 or 5-lobed, green, thinly pilose; flowers axillary; petals orbicular, 2 cm. long, lilac-violet; carpels numerous, 2 cm. long, rounded at apex, stellate-hirsute, each with 2 retrorse spines below.

4. ABUTILON Adans. Fam. Pl. **2**: 398. 1763.

Herbs, shrubs, or small trees; leaves usually cordate; flowers small or large, variously colored; calyx without bractlets; carpels of the fruit 4 to many, 2 to several-seeded, bivalvate.

Ovules 4 or more in each cell; flowers mostly large, usually 3 to 5 cm. long.
- Leaves deeply lobed ---------- **1. A. striatum.**
- Leaves not lobed.
  - Petals 1.5 cm. long or less; upper leaves sessile ------ **2. A. amplexifolium.**
  - Petals 2 to 5 cm. long; upper leaves petiolate.
    - Leaves crenate-dentate ---------- **3. A. purpusii.**
    - Leaves entire.
      - Calyx 1.7 cm. long or shorter.
        - Calyx 8 to 10 mm. long, the lobes triangular ------ **4. A. bakerianum.**
        - Calyx 13 to 17 mm. long, the lobes narrowly triangular or triangular-lanceolate ---------- **5. A. peyritschii.**
      - Calyx 2 cm. long or more, usually fully 2.5 cm. long.
        - Carpels broadly winged on the back ---------- **6. A. notolophium.**
        - Carpels not winged ---------- **7. A. yucatanum.**

Ovules usually 3 in each cell; flowers commonly smaller, nearly always less than 2.5 cm. long.
Flowers axillary.
Carpels rounded at apex.
Stems long-hirsute ---------- 8. **A. hirtum.**
Stems stellate-tomentose or pilosulous, never hirsute.
Leaves covered beneath with a very dense, minute, pale tomentum. 22. **A. incanum.**
Leaves green beneath, loosely stellate-pubescent.
Petals about 1 cm. long; leaves long-acuminate -- 9. **A. percaudatum.**
Petals 4 to 6 mm. long; leaves obtuse or acute ---- 10. **A. parvulum.**
Carpels narrowed at apex to a long or short beak.
Stems hirsute ---------- 11. **A. wrightii.**
Stems stellate-tomentose, never hirsute.
Peduncles viscid-pubescent.
Leaves with a closed basal sinus, the lobes overlapping. 12. **A. simulans.**
Leaves with an open sinus ---------- 13. **A. dugesii.**
Peduncles without viscid pubescence.
Carpels of the fruit stellate-hirsute, at least above.
Carpels abruptly narrowed into a very short beak. 14. **A. glabriflorum.**
Carpels gradually narrowed to a long beak.
Carpels about 1.5 cm. long; leaves green above, whitish beneath. 15. **A. hypoleucum.**
Carpels about 1 cm. long; leaves nearly concolorous. 35. **A. aurantiacum.**
Carpels finely stellate-tomentose.
Carpels abruptly short-pointed ---------- 16. **A. sphaerostaminum.**
Carpels gradually long-pointed.
Sepals equaling or longer than the carpels ---- 17. **A. lignosum.**
Sepals shorter than the carpels ---------- 18. **A. californicum.**
Flowers chiefly in umbels, panicles, or racemes.
Carpels rounded or obtuse at apex, very shortly or not at all beaked.
Carpels 4 or 5.
Calyx 10 to 12 mm. long ---------- 19. **A. bastardioides.**
Calyx 4 to 7 mm. long.
Calyx nearly as long as the carpels, erect ---------- 20. **A. malacum.**
Calyx less than half as long as the carpels, spreading or reflexed.
Carpels short-beaked; stems trigonous ---------- 21. **A. trisulcatum.**
Carpels usually not beaked; stems usually terete. 22. **A. incanum.**
Carpels more than 5, usually 8 or more.
Stems pilose with very long spreading hairs ---------- 23. **A. sonorae.**
Stems stellate-tomentose or short-pilose.
Flowers umbellate ---------- 24. **A. discolor.**
Flowers in large panicles.
Stems glabrate; calyx lobes broadly ovate, obtuse. 25. **A. reventum.**
Stems densely tomentose or tomentulose; calyx lobes ovate, acute.
Stems minutely tomentose; calyx less than half as long as the carpels ---------- 26. **A. andrieuxii.**
Stems loosely tomentose; calyx nearly as long as the carpels. 27. **A. xanti.**

Carpels acute, narrowed to a conspicuous beak.
Carpels 5.
Stems hirsute or hispid----------28. **A. thurberi.**
Stems finely stellate-pubescent.
Leaves broadly cordate-ovate, mostly 5 to 8 cm. wide.
29. **A. membranaceum.**
Leaves ovate or elliptic-ovate, 2 to 4 cm. wide----30. **A. ellipticum.**
Carpels 6 or more.
Stems pilose with long spreading hairs----------31. **A. giganteum.**
Stems stellate-tomentose or short-pilose.
Carpels (excluding the beaks) 6 to 7 mm. long; leaves green beneath.
Leaves deeply cordate at base----------32. **A. umbellatum.**
Leaves rounded or subcordate at base-----33. **A. hemsleyanum.**
Carpels 1 cm. long or usually much longer.
Calyx and carpels pilose or hirsute.
Petals 1 cm. long or less----------27. **A. xanti.**
Petals about 2 cm. long.
Carpels long-hirsute, the beaks suberect------34. **A. palmeri.**
Carpels short-hirsute, the beaks spreading.
35. **A. aurantiacum.**
Calyx and carpels finely stellate-tomentose.
Pedicels viscid-pubescent----------36. **A. holwayi.**
Pedicels not viscid-pubescent----------37. **A. dentatum.**

1. **Abutilon striatum** Dicks. in Lindl. Bot. Reg. 39. 1839.
? *Abutilon venosum* Lem. Fl. Serr. Jard. **2**[3]: *pl. 5.* 1846.
Specimens from Puebla have been seen by the writer, but perhaps all were taken from cultivated plants. Native of Guatemala.
Slender shrub, the branches glabrous; leaves 5 or 7-lobate, nearly glabrous, the lobes long-acuminate, serrate; flowers axillary; petals about 4 cm. long, orange veined with crimson or purple; carpels about 1.5 cm. long. "Monacillo amarillo" (Oaxaca, Durango, cultivated); "campanilla" (Guatemala).
Abutilon venosum, based upon cultivated plants of Mexican origin, is said to have petals as much as 7 cm. long.

2. **Abutilon amplexifolium** (DC.) Don, Hist. Dichl. Pl. **1**: 502. 1831.
Sida amplexifolia DC. Prodr. **1**: 469. 1824.
Jalisco to Veracruz.
Stems loosely pilose; leaves ovate-cordate, usually with overlapping basal lobes, long-acuminate, crenate-dentate, stellate-pilose beneath; flowers mostly paniculate, the petals 1.5 cm. long; carpels about 12, inflated, 1 cm. long, hirtellous.

3. **Abutilon purpusii** Standl., sp. nov.
Veracruz and Chiapas; type from Barranca de Tenampa, Zacuapan, Veracruz (*Purpus* 4332; U. S. Nat. Herb. no. 841806).
Stems finely stellate-tomentose; leaves broadly cordate, 10 to 20 cm. long, long-acuminate, deeply cordate at base, crenate-dentate, finely stellate-pubescent, sparsely so above; flowers mostly axillary, the peduncles 5 to 11 cm. long; calyx about 2 cm. long, densely brown or yellowish-tomentose, the lobes oval-ovate, mucronate; petals 3 cm. long or more; carpels 2.5 to 3 cm. long, rounded at apex, thinly stellate-tomentose.

4. **Abutilon bakerianum** Rose, Contr. U. S. Nat. Herb. **5**: 133. *pl. 11.* 1897.
Oaxaca and Chiapas; type from Tomellín Canyon, Oaxaca.
Tree, 4.5 to 6 meters high; leaves rounded-cordate, 3.5 to 15 cm. long, abruptly short-acuminate, green above, minutely stellate-tomentose beneath;

calyx lobes broadly ovate, finely tomentose; petals 3 cm. long; carpels 1.5 cm. long, rounded at apex, stellate-hirsute.

5. Abutilon peyritschii Standl.

Abutilon macranthum Peyr. Linnaea **30**: 59. 1859. Not *A. macranthum* St. Hil. 1825.

Veracruz; type from Zacuapan. Guatemala.

Small tree; leaves rounded-cordate, 5 to 20 cm. long, abruptly acuminate, deeply cordate at base, green and glabrate above, finely stellate-pubescent beneath; calyx brown-tomentose, the lobes oblong-ovate; petals 3 cm. long, yellow, purplish at base.

6. Abutilon notolophium A. Gray, Proc. Amer. Acad. **5**: 175. 1861.

Abutilon goldmani Baker & Rose, Contr. U. S. Nat. Herb. **5**: 170. 1899.

San Luis Potosí and Veracruz.

Leaves rounded-cordate, 7 to 21 cm. long, abruptly acuminate, deeply cordate at base, green and glabrate above, finely stellate-tomentose beneath; flowers axillary or umbellate; sepals densely tomentose; petals 3.5 cm. long, yellow; carpels 1.5 to 2 cm. long, stellate-hirsute.

7. Abutilon yucatanum Standl., sp. nov.

Type from La Vega, Yucatán (*Goldman* 634; U. S. Nat. Herb. No. 397004).

Stems, peduncles, and calyx densely covered with an orange-brown tomentum; leaves broadly cordate, 8 to 17 cm. long, acuminate, deeply cordate at base, entire, green above, beneath finely stellate-pubescent; peduncles axillary, 8 to 12 cm. long; calyx 2.2 cm. long, densely stellate-tomentose, the lobes acute; petals narrow, 4 to 4.5 cm. long; carpels 12 or more, 1.2 cm. long, stellate-tomentose.

8. Abutilon hirtum (Lam.) Sweet, Hort Brit. **1**: 53. 1826.

Sida hirta Lam. Encycl. **1**: 7. 1783.

Tamaulipas and Tabasco, and probably elsewhere; reported from Veracruz. Southern Florida, West Indies, and tropical Asia and Africa.

Stems minutely tomentulose and long-hirsute; leaves orbicular-cordate, acute, dentate, stellate-velutinous, calyx lobes broadly ovate, cuspidate, tomentose; petals 1.5 cm. long; carpels numerous, 1 cm. long, stellate-hirsute. "Botón de oro" (Veracruz, *Seler*); "buenas tardes" (Porto Rico).

9. Abutilon percaudatum Hochr., sp. nov.

Type from Río Verde, San Luis Potosí (*Palmer* 19; U. S. Nat. Herb. No. 470873).

Stems pilosulous with simple hairs; leaves ovate to rounded-cordate, 7 to 10 cm. long, deeply cordate at base, shallowly crenate, thinly stellate-pubescent; calyx lobes lance-ovate, coursely pubescent; petals 1 cm. long; carpels 1 cm long.

10. Abutilon parvulum A. Gray, Pl. Wright. **1**: 21. 1852.

Chihuahua and Sonora. Western Texas to Arizona and Colorado; type from Texas.

Plants usually herbaceous, the stems stellate-pubescent, 30 to 60 cm. high; leaves ovate-cordate, 2 to 5 cm. long, obtuse or acute, coarsely dentate, green, stellate-pubescent; petals orange-yellow; carpels 8 mm. long, minutely stellate-tomentose.

11. Abutilon wrightii A. Gray, Bost. Journ. Nat. Hist. **6**: 162. 1850.

Sonora and Coahuila. Western Texas; type collected along the Rio Grande.

Stems chiefly herbaceous, 20 to 60 cm. high, densely hirsute; leaves broadly cordate, 2 to 4 cm. long, obtuse or rounded at apex, deeply cordate at base,

crenate, densely white-tomentose beneath; petals yellow, carpels nearly 1.5 cm. long, long-beaked, stellate-pilose.

12. Abutilon simulans Rose, Contr. U. S. Nat. Herb. **8**: 318. 1905.

Jalisco to Morelos and Oaxaca; type from Cuernavaca, Morelos.

Plants 1.5 to 2.5 meters high, the stems viscid-pubescent; leaves ovate or broadly cordate, 6 to 17 cm. long, long-acuminate, crenate or coarsely dentate, beneath covered with a fine close whitish stellate tomentum; calyx lobes broadly ovate and overlapping, finely tomentose; petals yellow, about 1.5 cm. long; carpel bodies 10 to 13 mm. long, long-beaked.

Doubtfully distinct from the next species.

13. Abutilon dugesii S. Wats. Proc. Amer. Acad. **21**: 447. 1886.

Querétaro and Guanajuato; type from Guanajuato.

Stems viscid-pubescent; leaves ovate or broadly cordate, 4 to 10 cm. long, acuminate, crenate or dentate, densely stellate-tomentose beneath; calyx lobes ovate, acuminate; petals orange, 6 to 10 mm. long; carpels about 10, 10 to 12 mm. long, long-beaked, finely stellate-pubescent.

14. Abutilon glabriflorum Hochr., sp. nov.

Tamaulipas; type from Victoria (*Palmer* 373; U. S. Nat. Herb. no. 572603).

Shrub, the stems truly fruticose, glabrate in age; leaves broadly cordate, 3.5 to 7 cm. long, acute or acuminate, shallowly crenate or denticulate, densely stellate-pubescent, whitish beneath; sepals broadly ovate, acute; petals 1.5 to 2 cm. long; carpels 10 to 12 mm. long.

15. Abutilon hypoleucum A. Gray, Pl. Wright. **1**: 20. 1852.

Abutilon selerianum Ulbrich, Repert. Nov. Sp. Fedde **12**: 227. 1913.

Coahuila to San Luis Potosí and Puebla; type from Monterrey, Nuevo León. Western Texas.

Stems suffrutescent, tomentose, in age reddish brown and glabrate; leaves lance-ovate to broadly cordate, 4 to 11 cm. long, long-acuminate, deeply cordate at base, crenate or dentate, green above, densely white-tomentose beneath; calyx lobes ovate, overlapping at base; petals 2 to 2.5 cm. long.

16. Abutilon sphaerostaminum Hochr., sp. nov.

Veracruz; type from Zacuapan (*Purpus* 2234; U. S. Nat. Herb. no. 840351).

Small shrub with tomentose or glabrate stems; leaves broadly cordate, 5 to 12 cm. long, long-acuminate, shallowly crenate or dentate, densely or finely white-tomentose beneath; sepals broadly ovate, acuminate, finely tomentose; carpels 10 to 12 mm. long.

17. Abutilon lignosum (Cav.) Don, Hist, Dichl. Pl. **1**: 501. 1831.

Sida lignosa Cav. Monad. Diss. 34. *pl. 9. f. 2.* 1790.

Abutilon jacquini Don, Hist. Dichl. Pl. **1**: 503. 1831.

Abutilon berlandieri A. Gray; S. Wats. Proc. Amer. Acad. **20**: 358. 1885.

Abutilon scabrum S. Wats. Proc. Amer. Acad. **24**: 41. 1889.

Sonora and Chihuahua to Yucatán and Jalisco. Southern Florida and Texas; West Indies; type from Santo Domingo.

Plants suffrutescent, 1 to 2 meters high; leaves ovate to broadly cordate, 5 to 15 cm. long, usually long-acuminate, crenate or dentate, densely stellate-tomentose beneath; sepals cordate-ovate, acuminate; petals 1 to 1.5 cm. long; carpels 10 to 12 mm. long. "Colotahue," "pelotazo bronco" (Sinaloa).

The fiber of the stems is employed in western Mexico for making twine and rope.

18. Abutilon californicum Benth. Bot. Voy. Sulph. 8. 1844.

Abutilon lemmoni S. Wats. Proc. Amer. Acad. **20**: 357. 1885.

Baja California and Sonora to Oaxaca; type from Magdalena Bay, Baja California.

Shrub, 1 to 2.5 meters high, the stems brownish or yellowish-tomentose; leaves broadly cordate, 1.5 to 5 cm. long, rounded to short-acuminate at apex. crenate, thick, stellate-tomentose; sepals broadly ovate, acuminate; petals 1 to 1.5 cm. long; carpels 10 to 12 mm. long.

19. Abutilon bastardioides Baker f. Contr. U. S. Nat. Herb. **1**: 306. 1895.

Known only from the type locality, Colima.

Stems suffrutescent; leaves rounded-cordate, 4 to 7 cm. long, short-acuminate, repand-dentate, pale beneath and finely stellate-pubescent; sepals lance-ovate; petals 12 mm. long; carpels finely tomentose.

20. Abutilon malacum S. Wats. Proc. Amer. Acad. **21**: 446. 1886.

Chihuahua, Coahuila, and Durango. Western Texas and southern New Mexico; type from Texas.

Stems very minutely tomentose; leaves rounded-cordate, 4 to 9 cm. long, obtuse to short-acuminate, coarsely dentate, minutely tomentose; calyx lobes lance-ovate, acute or acuminate; petals orange, 7 to 9 mm. long; carpels 7 to 9 mm. long, stellate-tomentose.

21. Abutilon trisulcatum (Jacq.) Urban, Repert. Sp. Nov. Fedde **16**: 32. 1919.

Sida trisulcata Jacq. Enum. Pl. Carib. 26. 1760.

Sida triquetra L. Sp. Pl. ed. 2. 963. 1763.

Abutilon triquetrum Sweet, Hort. Brit. 53. 1827.

? *Abutilon floribundum* Schlecht. Linnaea **11**: 366. 1837.

Sonora to Tamaulipas, Yucatán, and Guerrero. Cuba; Nicaragua.

Stems herbaceous or suffrutescent, 1 to 2.5 meters high, obtusely trigonous, minutely tomentulose; leaves narrowly or broadly cordate, 4 to 15 cm. long, long-acuminate, crenate or subentire, grayish and minutely stellate-velutinous on both surfaces; calyx lobes ovate, acuminate; petals yellow, 5 mm. long; carpels 6 to 8 mm. long. "Amantillo" (Jalisco, *Oliva*); "sacxin" (Yucatán, *Dondé*); "tronador" (Colima).

Palmer reports that in Colima the fiber extracted from the stems is utilized in making rope, hammocks, and nets. The stems are buried in mud for three or four days, then washed, and the bark (which contains the fiber) stripped from the stems by hand.

22. Abutilon incanum (Link) Sweet, Hort. Brit. 53. 1827.

Sida incana Link, Enum. Pl. **2**: 204. 1822.

Abutilon ramosissimum Presl, Rel. Haenk. **2**: 116. 1836.

Abutilon texense Torr. & Gray, Fl. N. Amer. **1**: 231. 1838.

Baja California and Sonora to Nuevo León, San Luis Potosí, and Sinaloa. Hawaii.

Shrub, 2.5 meters high or less, the stems minutely tomentose; leaves broadly cordate, 1.5 to 6 cm. long, obtuse to acuminate, crenate or dentate, finely grayish-tomentose; sepals broadly ovate, mucronate; petals yellow or orange, often purple at base, 6 to 9 mm. long; carpels 6 to 7 mm. long, minutely tomentose. "Pelotazo chico" (Sinaloa).

This, like *A. trisulcatum*, is a source of fiber. *A. racemosum* Schlecht.[1] is probably a synonym of this species.

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[1] Linnaea **11**: 367. 1837.

23. Abutilon sonorae A. Gray, Pl. Wright. **2**: 23. 1853.

Chihuahua and Sonora to Guerrero; type collected on the Sonoita, Sonora.

Stems 1 meter high or less, chiefly herbaceous, puberulent and long-pilose; leaves rounded-cordate, 7 to 18 cm. long, acuminate, usually subtrilobate, irregularly dentate, whitish-tomentose beneath; sepals broadly ovate, acute; petals yellow, about 6 mm. long; carpels 7 to 11, 8 to 10 mm. long, stellate-pubescent.

24. Abutilon discolor Baker f. Journ. Bot. Brit. & For. **31**: 73. 1893.

San Luis Potosí and Tamaulipas (?); type from Tula, Tamaulipas (?).

Stems reddish or yellowish-pubescent; leaves acuminate, 4 to 10 cm. long, entire or nearly so, stellate-pubescent beneath; sepals lance-ovate to broadly ovate, acuminate; carpels reniform, stellate-hirsute.

25. Abutilon reventum S. Wats. Proc. Amer. Acad. **21**: 418. 1886.

Chihuahua and Sonora to Oaxaca, Querétaro, and Zacatecas; type from Hacienda San José, Chihuahua. Southern Arizona.

Leaves broadly cordate or reniform-cordate, 6 to 25 cm. long, abruptly acuminate, sometimes shallowly trilobate, irregularly crenate or subentire, white beneath with a velutinous tomentum; petals deep orange, 10 to 12 mm. long; carpels about 8, 7 to 10 mm. long, stellate-pilosulous.

26. Abutilon andrieuxii Hemsl. Diag. Pl. Mex. 24. 1879.

Abutilon reticulatum Rose, Contr. U. S. Nat. Herb. **5**: 171. 1899.

Tepic to Oaxaca and Puebla; type from Tlacolula, Oaxaca.

Shrub, 1 to 4.5 meters high; leaves rounded-cordate, 4 to 22 cm. long, acute or abruptly short-acuminate, sometimes shallowly trilobate, obscurely crenate or subentire, covered beneath with a fine whitish stellate tomentum; petals yellow, 12 to 15 mm. long; carpels 8 or 9, stellate-pilose, 1 cm. long.

27. Abutilon xanti A. Gray, Proc. Amer. Acad. **22**: 301. 1887.

Southern Baja California; type from Cape San Lucas.

Shrub, 1 to 3.5 meters high; leaves rounded-cordate, 8 to 20 cm. long, short-acuminate, often shallowly trilobate, irregularly dentate or subentire, whitish beneath with a velutinous tomentum; petals 8 mm. long, pale yellow; carpels 1 cm. long, stellate-pilose.

28. Abutilon thurberi A. Gray, Mem. Amer. Acad. n. ser. **5**: 307. 1854.

Type from Magdalena, Sonora.

Stems 30 to 60 cm. high; leaves ovate-cordate, 5 cm. long or less, green, thinly stellate-pubescent, serrate; calyx hirsute; petals orange-yellow; carpels sparsely hirsute.

29. Abutilon membranaceum Baker f. Contr. U. S. Nat. Herb. **3**: 312. 1895.

Known only from the type locality, Tepic.

Stems slender, suffrutescent, sparsely pubescent; leaves broadly ovate, 5 to 12 cm. long, cuspidate-acuminate, rounded or subcordate at base, very thin, coarsely crenate-dentate, green and very sparsely stellate-pubescent; sepals ovate, acuminate; carpels stellate-hirtellous, 8 mm. long.

30. Abutilon ellipticum Schlecht. Linnaea **11**: 368. 1837.

Abutilon attenuatum Robins. & Seat. Proc. Amer. Acad. **28**: 104. 1893.

Jalisco, Michoacán, and Hidalgo; type from Tlalpujahua, Michoacán.

Slender shrub; leaves 4 to 7 cm. long, obtuse to long-acuminate, sometimes shallowly trilobate, crenate or serrate, green above, paler beneath and stellate-tomentose; sepals broadly ovate, cuspidate-acuminate; petals 8 to 10 mm. long; carpels 1 cm. long, stellate-hirsute, very long-beaked.

Abutilon erosum Schlecht.[1] is perhaps the same species.

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[1] Linnaea **11**: 367. 1837.

31. Abutilon giganteum (Jacq.) Presl, Rel. Haenk. **2**: 116. 1836.

Sida gigantea Jacq. Pl. Hort. Schönbr. **2**: 8. *pl. 141.* 1797.

Sida elata Macfad. Fl. Jam. 87. 1837.

? *Abutilon mexicanum* Presl, Rel. Haenk. **2**: 115. 1836.

Abutilon divaricatum Turcz. Bull. Soc. Nat. Moscou **31**[1]: 204. 1859.

Abutilon elatum Griseb. Fl. Brit. W. Ind. 79. 1859.

Veracruz and Guerrero. West Indies, Central America, and South America.

Shrub, 1 to 2 meters high; leaves broadly cordate, 6 to 18 cm. long, acute to long-acuminate, crenate or dentate, densely stellate-velutinous beneath; petals yellow, 1 to 1.5 cm. long; carpels 12 mm. long, stellate-pilose.

32. Abutilon umbellatum (L.) Sweet, Hort. Brit. 53. 1826.

Sida umbellata L. Syst. Nat. ed. 10. **2**: 1145. 1759.

Jalisco to Oaxaca, and doubtless elsewhere; Yucatán (?). West Indies and South America.

Leaves broadly cordate, 4 to 9 cm. long, obtuse or acute, crenate or dentate, green, thinly stellate-pubescent beneath; petals yellow, about 1 cm. long; carpels stellate-hirsute, long-beaked.

33. Abutilon hemsleyanum Rose, Contr. U. S. Nat. Herb. **10**: 123. 1906.

Abutilon sidoides Hemsl. Diag. Pl. Mex. 24. 1879. Not *A. sidoides* Dalz. & Gibs. 1861.

Jalisco to San Luis Potosí, Mexico, and Oaxaca; type from the region of San Luis Potosí.

Stems 1 to 1.5 meters high, stellate-pubescent; leaves lance-ovate to broadly ovate, 5 to 14 cm. long, acute to long-acuminate, crenate or dentate, green beneath but rather densely stellate-pubescent; sepals broadly ovate, acuminate; petals 8 to 10 mm. long; carpels hispid-stellate, with very long beaks.

Probably not sufficiently distinct from *A. umbellatum.*

34. Abutilon palmeri A. Gray, Proc. Amer. Acad. **8**: 289. 1870.

Abutilon macdougalii Rose & Standl. Contr. U. S. Nat. Herb. **16**: 13. *pl. 4.* 1912.

Baja California and Sonora; type from Sonora.

Stems hirsute and villosulous and somewhat viscid; leaves broadly cordate, 4 to 10 cm. long, acute or acuminate, coarsely dentate, often shallowly trilobate, densely stellate-velutinous; sepals ovate, cuspidate-acuminate, long-pilose; carpels densely soft-pilose.

35. Abutilon aurantiacum S. Wats. Proc. Amer. Acad. **20**: 357. 1885.

Baja California; type from Bahía de Todos Santos.

Leaves rounded-cordate, 3 to 13 cm. long, obtuse or acute, dentate and often shallowly trilobate, densely stellate-velutinous; calyx lobes broadly ovate, acute, pilose; petals orange; carpels about 10, 8 mm. long, pilose.

36. Abutilon holwayi Rose, Contr. U. S. Nat. Herb. **8**: 318. 1905.

Abutilon durangense Rose & York, Contr. U. S. Nat. Herb. **10**: 123. *pl. 40.* 1906.

Durango to Querétaro and Oaxaca; type from Oaxaca.

Stems viscid-pubescent; leaves ovate-cordate, 4 to 12 cm. long, acute or acuminate, crenate or subentire, densely stellate-tomentose beneath; sepals broadly ovate, acuminate; petals 1.5 cm. long or less.

37. Abutilon dentatum Rose, Contr. U. S. Nat. Herb. **8**: 318. 1905.

Known only from the type locality, near the city of Chihuahua.

Leaves ovate-cordate, 6 to 10 cm. long, acuminate, dentate, densely stellate-tomentose beneath; sepals broadly ovate, cuspidate-acuminate.

DOUBTFUL SPECIES.

ABUTILON BLANDUM Fenzl, Del. Sem. Hort. Vindob. 1830. Type from Los Baños.

ABUTILON HAENKEANUM Presl, Rel. Haenk. **2**: 115. 1836. Type from western Mexico.

5. WISSADULA Medic. Malvenfam. 24. 1787.

REFERENCE: R. E. Fries, Svensk. Vet. Akad. Handl. **43**[4]: 1–95. 1908.

Shrubs or herbs, with stellate pubescence; leaves petiolate, entire or dentate; flowers axillary or in terminal panicles; carpels usually 5, laterally constricted, commonly 3-seeded.

Leaves entire.
- Leaves glabrous above or strigose with simple hairs---------1. **W. excelsior.**
- Leaves minutely stellate-pubescent on the upper surface. 2. **W. amplissima.**

Leaves crenate-dentate.
- Stamen tube short, hirsute; leaves not lobate; carpels 3.
  - Calyx tomentose, without long spreading hairs--------3. **W. tricarpellata.**
  - Calyx tomentose and long-pilose.
    - Branches finely tomentulose, not pilose----------4. **W. cincta.**
    - Branches tomentulose and long-pilose.
      - Seeds 4 in each carpel---------- 5. **W. gracilis.**
      - Seeds 3 in each carpel.
        - Leaves orbicular-cordate, abruptly acuminate; petals 10 mm. long. 6. **W. wissaduloides.**
        - Leaves ovate, long-attenuate; petals 7 mm. long--7. **W. hirsutiflora.**
- Stamen tube elongate, glabrous; leaves often lobate or angulate; carpels 5.
  - Branches tomentose with stellate glandular hairs, and with long simple hairs above----------8. **W. trilobata.**
  - Branches stellate-tomentose, sometimes with short glandular hairs above.
    - Calyx lobes 4 to 7 mm. long, acuminate; carpels beaked. 9. **W. holosericea.**
    - Calyx lobes 1.5 mm. long, obtuse; carpels not beaked--10. **W. microcalyx.**

1. Wissadula excelsior (Cav.) Presl, Rel. Haenk. **2**: 118. 1836.

Sida excelsior Cav. Monad. Diss. 27. *pl. 5. f. 3.* 1785.

Veracruz and Chiapas. Cuba, Central America, and South America.

Shrub; leaves ovate or oblong-ovate, the upper ones often subsessile, long-acuminate, stellate-pubescent beneath, the pubescence ferruginous along the nerves; flowers in lax panicles; petals yellowish, 4 mm. long; carpels 5, 8 mm. long, apiculate.

2. **Wissadula amplissima** (L.) R. E. Fries, Svensk. Vet. Akad. Handl. **43**[4]: 48. 1908.

Sida amplissima L. Sp. Pl. 685. 1753.

Wissadula mucronulata A. Gray in Torr. U. S. & Mex. Bound. Bot. 39. 1859.

Abutilon mucronulatum A. Gray, Proc. Amer. Acad. **5**: 175. 1862.

Sinaloa to Tamaulipas, Morelos, and Oaxaca. Western Texas, Central America, South America, and Africa.

Shrub, 1.5 to 2.5 meters high; leaves broadly cordate, 5 to 15 cm. long, acuminate, densely stellate-tomentulose beneath; flowers axillary or paniculate; petals yellow, 4 to 6 mm. long; carpels 4 or 5, 6 to 10 mm. long, apiculate.

3. **Wissadula tricarpellata** Robins. & Greenm.; Rose, Contr. U. S. Nat. Herb. **5**: 179. 1899.

Wissadula hirsutiflora tricarpellata R. E. Fries, Svensk. Vet. Akad. Handl. **43**[4]: 82. 1908.

Jalisco and Colima; type from Tequila, Jalisco.

Leaves ovate or broadly cordate, 3 to 8 cm. long, acuminate or long-acuminate, thinly stellate-pubescent beneath; petals 6 to 7 mm. long, purplish when dry; carpels not beaked.

4. **Wissadula cincta** (T. S. Brandeg.) Rose, Contr. U. S. Nat. Herb. **5**: 178. 1899.

Abutilon cinctum T. S. Brandeg. Zoe **3**: 348. 1893.

Wissadula incana T. S. Brandeg. Zoe **5**: 210. 1905.

Sonora; type from Los Duraznillos.

Slender shrub; leaves broadly cordate, 1 to 2.5 cm. long, obtuse or acute, densely grayish-tomentose; flowers chiefly axillary; petals 7 mm. long, purplish, at least when dry; carpels 6 mm. long, not beaked.

5. **Wissadula gracilis** Hochr. Ann. Cons. Jard. Genève **6**: 30. 1902.

Known only from the type locality, Tututepeque, Oaxaca.

Leaves ovate-cordate, 1 to 2 cm. long, acuminate, hirsute; flowers axillary; petals 1 cm. long.; carpels 8 mm. long.

6. **Wissadula wissaduloides** (Baker f.) Rose, Contr. U. S. Nat. Herb. **5**: 179. 1899.

Abutilon wissaduloides Baker f. Contr. U. S. Nat. Herb. **3**: 312. 1895.

Known only from the type locality, Imala, Sinaloa.

Leaves 5 to 8 cm. long, finely stellate-pubescent beneath; flowers axillary and paniculate; carpels 6 mm. long, not beaked.

7. **Wissadula hirsutiflora** (Presl) Rose, Contr. U. S. Nat. Herb. **1**: 306. 1895.

Bastardia hirsutiflora Presl, Rel. Haenk. **2**: 112. 1836.

Tepic and Guerrero; type from Acapulco, Guerrero.

Leaves 3 to 6 cm. long, densely stellate-tomentose; flowers chiefly axillary; carpels 5 to 6 mm. long, apiculate.

8. **Wissadula trilobata** (Hemsl.) Rose, Contr. U. S. Nat. Herb. **5**: 178. 1899.

Abutilon trilobatum Hemsl. Diag. Pl. Mex. 24. 1879.

Wissadula acuminata Rose, Contr. U. S. Nat. Herb. **5**: 144. 1897.

San Luis Potosí, Veracruz, Querétaro, Guanajuato, and Hidalgo; type from the region of San Luis Potosí.

Shrub or herb, 1 to 2 meters high; leaves broadly cordate, 5 to 17 cm. long, acuminate, coarsely dentate, often trilobate, stellate-tomentose beneath; flowers axillary and paniculate; petals 10 to 12 mm. long; carpels 9 mm. long, beaked.

9. **Wissadula holosericea** (Scheele) Garcke, Zeitschr. Naturw. **63**: 124. 1890.

Abutilon holosericeum Scheele, Linnaea **21**: 471. 1848.

Coahuila, Nuevo León, and Durango. Texas.

Leaves ovate to suborbicular, 6 to 20 cm. long, acute or acuminate, often trilobate, densely stellate-tomentose; flowers axillary or paniculate; petals yellow, 12 mm. long; carpels 8 mm. long, beaked.

10. **Wissadula microcalyx** Rose; R. E. Fries, Svensk. Vet. Akad. Handl. **43**[4]: 87. 1908.

Known only from the type locality, Tehuacán, Puebla.

Leaves ovate or orbicular-cordate, 7 to 18 cm. long, acute or acuminate, often shallowly trilobate, densely stellate-tomentose; flowers paniculate; petals about 1.5 cm. long, yellow.

DOUBTFUL SPECIES.

WISSADULA GLANDULOSA Rose, Contr. U. S. Nat. Herb. **10**: 123. 1906. Type collected between Higuerillas and San Pablo, Querétaro. Probably a species of *Pseudabutilon*. Type not seen.

6. PSEUDABUTILON R. E. Fries, Svensk. Vet. Akad. Handl. **43**[4]: 96. 1908.

REFERENCE: R. E. Fries, Svensk. Vet. Akad. Handl. **43**[4]: 96–108. 1908.

Shrubs or herbs, with stellate pubescence; flowers axillary or in terminal spikes or panicles, ebracteolate; ovules 3; carpels 5 to 11, usually apiculate or rostrate, falsely 2-celled; seeds 3.

Carpels 10 or 11.
- Carpels conspicuously short-beaked ..... **1. P. paniculatum.**
- Carpels not beaked ..... **2. P. scabrum.**

Carpels 5.
- Flowers in terminal spikelike panicles; fruit 8 mm. or less in diameter. **3. P. spicatum.**
- Flowers axillary or in loose panicles; fruit more than 10 mm. in diameter.
  - Branches long-pilose and tomentose ..... **4. P. pringlei.**
  - Branches stellate-tomentose but not pilose.
    - Calyx in anthesis 10 mm. long ..... **5. P. lozani.**
    - Calyx 6 mm. long or less ..... **6. P. rosei.**

1. Pseudabutilon paniculatum (Rose) R. E. Fries, Svensk. Vet. Akad. Handl. **43**[4]: 104. 1908.

Wissadula paniculata Rose, Contr. U. S. Nat. Herb. **5**: 178. 1899.

Sinaloa; type from Imala.

Slender shrub, 1.5 to 2.5 meters high; leaves broadly ovate-cordate, 9 cm. long or less, cuspidate-acuminate, crenate-dentate, green, sparsely stellate-pubescent; flowers paniculate; petals yellow, 1 to 1.8 cm. long; carpels 4 to 5 mm. long.

2. Pseudabutilon scabrum (Presl) R. E. Fries, Svensk. Vet. Akad. Handl. **43**[4]: 103. 1908.

Wissadula scabra Presl, Rel. Haenk. **2**: 117. 1836.

Jalisco and probably elsewhere; type from some unknown locality.

Shrub, 2 to 2.5 meters high; leaves broadly cordate-ovate, 13 cm. long or less, cuspidate-acuminate, dentate, green, thinly stellate-pubescent; flowers paniculate; petals yellow, about 12 mm. long; carpels 6 to 7 mm. long.

3. Pseudabutilon spicatum (H. B. K.) R. E. Fries, Svensk. Vet. Akad. Handl. **43**[4]: 98. 1908.

Abutilon spicatum H. B. K. Nov. Gen. & Sp. **5**: 271. 1821.

Wissadula spicata Presl, Rel. Haenk. **2**: 117. 1836.

Wissadula elongata T. S. Brandeg. Zoe **5**: 210. 1905.

Sinaloa to Guerrero. Cuba, Central America, and South America; type from the Río Negro.

Shrub or herb, 0.5 to 2 meters high; leaves reniform-cordate, 6 to 18 cm. long and wide, abruptly acuminate, obscurely dentate, often shallowly trilobate, green above, rather densely stellate-pubescent beneath; petals yellow, 6 to 7 mm. long; carpels 4 to 5 mm. long.

4. Pseudabutilon pringlei (Rose) R. E. Fries, Svensk. Vet. Akad. Handl. **43**[4]: 99. 1908.

Wissadula pringlei Rose, Contr. U. S. Nat. Herb. **3**: 312. 1895.

Puebla and Oaxaca; type from the State of Oaxaca.

Shrub or herb, about a meter high; leaves broadly cordate, 5 to 7.5 cm. long, cuspidate-acuminate, crenulate, densely stellate-tomentose; petals 10 to 12 mm. long; carpels 8 to 10 mm. long, beaked.

The same or a closely related plant, of which only imperfect material is available, occurs in Tepic.

5. **Pseudabutilon lozani** (Rose) R. E. Fries, Svensk. Vet. Akad. Handl. **43**[4]: 100. 1908.

Wissadula lozani Rose, Contr. U. S. Nat. Herb. **10**: 124. *pl. 41.* 1906.

Type from El Carrizo, Nuevo León. Also in western Texas.

Leaves broadly cordate, 5 to 11 cm. long, acute or obtuse, crenulate, densely stellate-tomentose; petals yellow, 10 to 12 mm. long; carpels 8 mm. long, short-beaked.

6. **Pseudabutilon rosei** R. E. Fries, Svensk. Vet. Akad. Handl. **43**[4]: 102. 1908.

Wissadula conferta T. S. Brandeg. Zoe **5**: 250. 1908.

Querétaro and Puebla; type from Tehuacán, Puebla.

Leaves broadly cordate, 6 to 12 cm. long, acute or obtuse, crenate, sometimes shallowly trilobate, densely stellate-tomentose; petals 8 mm. long; carpels 6 mm. long, not beaked.

7. **BASTARDIA** H. B. K. Nov. Gen. & Sp. **5**: 254. 1821.

Shrubs or herbs; leaves cordate, petiolate; flowers yellow, axillary, the peduncles 1-flowered; bractlets none; carpels 5, 1-seeded.

Carpels slender-beaked ..... 1. **B. bivalvis.**
Carpels not beaked ..... 2. **B. viscosa.**

1. **Bastardia bivalvis** (Cav.) H. B. K. Nov. Gen. & Sp. **5**: 255. 1821.

Sida bivalvis Cav. Monad. Diss. 13. *pl. 11, f. 3.* 1785.

Bastardia berlandieri A. Gray, Proc. Amer. Acad. **22**: 295. 1887.

Michoacán to Oaxaca and Veracruz. Greater Antilles and South America.

Slender shrub, 1.5 to 2.5 meters high, the branches tomentose and viscid-pilose; leaves ovate-cordate, 1.5 to 6 cm. long, obtuse to acuminate, crenulate, densely stellate-tomentose beneath; petals about 8 mm. long; fruit 5-lobate, 8 mm. broad.

2. **Bastardia viscosa** (L.) H. B. K. Nov. Gen. & Sp. **5**: 256. 1821.

Sida viscosa L. Syst. Nat. ed. 10. **2**: 1145. 1759.

Tamaulipas and Veracruz; reported from Guerrero. West Indies and South America.

Shrub or herb, 0.5 to 1 meter high, the branches viscid-pubescent; leaves ovate-cordate, 2 to 6 cm. long, acuminate, sinuate-dentate, paler beneath and stellate-tomentulose; petals 6 mm. long; fruit about 6 mm. wide.

8. **GAYA** H. B. K. Nov. Gen. & Sp. **5**: 266. 1821.

Shrubs or herbs; leaves toothed; flowers yellowish or purplish, chiefly solitary in the axils, sometimes racemose; carpels 8 or more, membranaceous, bivalvate, 1-seeded.

Carpels 25 to 30, 10 to 12 mm. long ..... 1. **G. occidentalis.**
Carpels 8 to 14, 6 mm. long or less.
  Stems long-pilose ..... 2. **G. violacea.**
  Stems puberulent or short-pilose.
    Petals 5 to 6 mm. long ..... 3. **G. minutiflora.**
    Petals 10 to 12 mm. long ..... 4. **G. calyptrata.**

1. **Gaya occidentalis** (L.) H. B. K. Nov. Gen. & Sp. **5**: 208. 1821.
Sida occidentalis L. Amoen. Acad. **4**: 325. 1759.
Tamaulipas and Veracruz. Cuba and Hispaniola.
Plants suffrutescent, about a meter high; leaves oblong to ovate, 1.5 to 6 cm. long, obtuse or acute, serrulate, densely stellate-tomentose; petals yellow, 1.5 to 2 cm. long.

2. **Gaya violacea** Rose, Contr. U. S. Nat. Herb. **12**: 286. 1909.
Known only from the type locality, Sierra Madre near Monterrey, Nuevo León.
Shrub, 2 meters high or less; leaves ovate or lance-ovate, 6 to 9 cm. long, long-acuminate, coarsely crenate, green above, pale beneath and minutely stellate-pubescent; petals 8 mm. long; carpels 8 or 9.

3. **Gaya minutiflora** Rose, Contr. U. S. Nat. Herb. **1**: 305. 1895.
Colima to Oaxaca and Morelos; type from Colima.
Slender shrub or herb; leaves ovate or ovate-oblong, 2 to 6.5 cm. long, acuminate, finely or coarsely crenate-dentate, thinly stellate-pubescent; carpels 9 or 10.

4. **Gaya calyptrata** (Cav.) H. B. K. Nov. Gen. & Sp. **5**: 208. 1821.
Sida calyptrata Cav. Monad. Diss. 57. 1780.
Sida disticha Cav. Icon. Pl. **5**: 12. *pl. 57*. 1799.
Gaya hermannioides H. B. K. Nov. Gen. & Sp. **5**: 209. *pl. 475*. 1821.
Sida gaya DC. Prodr. **1**: 466. 1824.
Gaya disticha Presl, Rel Haenk **2**: 113, 1836.
Veracruz, Puebla, and Chiapas. Central America and South America.
Slender shrub or herb; leaves ovate to lance-oblong, 2 to 4 cm. long, obtuse to acuminate, finely or coarsely serrate, sparsely or densely stellate-pubescent; carpels 10 to 14.

9. ROBINSONELLA Rose & Baker, Gard. & For. 10: 244. 1897.

Shrubs or trees; leaves petiolate, entire, dentate, or lobate; flowers chiefly axillary, usually fasciculate, large and showy, ebracteolate; carpels membranaceous, inflated at maturity.

Leaves deeply 3 or 5-lobate _____ 1. **R. lindeniana.**
Leaves obscurely or not at all lobate.
Leaves covered beneath with a minute appressed pale silvery tomentum. 2. **R. discolor.**
Leaves loosely stellate-pubescent beneath, pilose along the nerves. 3. **R. cordata.**

1. **Robinsonella lindeniana** (Turcz.) Rose & Baker, Gard. & For. **10**: 245. 1897.
Sida lindeniana Turcz. Bull. Soc. Nat. Moscou **31**[1]: 200. 1838.
Sida ghisbreghtiana Turcz. Bull. Soc. Nat. Moscou **31**[1]: 200. 1838.
Abutilon ambiguum Turcz. Bull. Soc. Nat. Moscou **31**[1]: 205. 1838.
Veracruz; type from Mirador.
Shrub, 2.5 to 3 meters high or larger; leaves 7 to 25 cm. wide, the lobes acute or acuminate, entire or dentate, green above, coarsely stellate-tomentose beneath; petals white, 7 to 8 mm. long; carpels 7 to 8 mm. long, not beaked, stellate-pubescent.

2. **Robinsonella discolor** Rose & Baker, Contr. U. S. Nat. Herb. **5**: 181. 1899.
Known only from the type locality, Las Palmas, San Luis Potosí, altitude 90 to 120 meters.

Slender tree, 6 to 9 meters high; leaves broadly cordate to orbicular-cordate, 4 to 10 cm. long, acute or acuminate, green above; petals white, 8 mm. long; carpels about 12, 8 to 10 mm. long.

3. **Robinsonella cordata** Rose & Baker, Gard. & For. **10**: 244. *f. 31.* 1897.

Durango to Puebla and Oaxaca; type from Tamazulapan, Oaxaca.

Tree, 4.5 to 9 meters high; leaves ovate-cordate, 4 to 13 cm. long, long-acuminate, crenate-dentate, glabrate above; petals white or purplish, 1.5 to 2.5 cm. long. "Guácima" (Durango).

10. SIDA L. Sp. Pl. 683. 1753.

Herbs or shrubs, with stellate-pubescence; leaves entire or toothed; flowers sessile or pedicellate, axillary, racemose, or paniculate, the pedicels often jointed; bractlets none; carpels 5 or more, 1-seeded, bivalvate or indehiscent.

Few of the species listed below are true shrubs, but it has appeared more satisfactory to list all of them here as a matter of record and convenience.

Flowers adnate to the petioles of leaflike bracts; petioles hirsute; flowers congested at the ends of the branches; carpels muricate.
- Plants decumbent; leaves oblong to oval; petals 7 to 10 mm. long. 1. S. ciliaris.
- Plants erect; leaves linear or oblong-linear; petals 12 to 15 mm. long. 2. S. anomala.

Flowers never adnate to the petioles of leaflike bracts; petioles usually not hirsute; flowers variously arranged; carpels not muricate.
- Calyx terete.
  - Leaves entire, linear ---------- 3. S. linifolia.
  - Leaves serrate or dentate.
    - Leaves cuneate at base, narrowly lanceolate.
      - Leaves glabrous on the upper surface; inflorescence naked or nearly so ---------- 4. S. lodiegensis.
      - Leaves densely stellate-pubescent on both surfaces; inflorescence densely leafy ---------- 5. S. stricta.
    - Leaves all or mostly cordate at base, oblong to rounded-cordate.
      - Pedicels less than twice as long as the calyx in anthesis. 6. S. pyramidata.
      - Pedicels mostly more than three times as long as the calyx in anthesis.
        - Flowers in open panicles.
          - Leaves densely stellate-pilosulous, crenate ------ 7. S. paniculata.
          - Leaves green, sparsely and very minutely stellate-pubescent, laciniate-serrate ---------- 8. S. tehuacana.
        - Flowers solitary in the leaf axils.
          - Leaves pilose on the upper surface with mostly simple hairs; upper leaves nearly sessile ---------- 9. S. filipes.
          - Leaves minutely stellate-tomentose on the upper surface; upper leaves slender-petiolate ---------- 10. S. palmeri.
- Calyx conspicuously angulate.
  - Carpels 7 to 12.
    - Leaves, all or most of them, deeply cordate at base, ovate-cordate, densely stellate-velutinous.
      - Stems and calyx pilose with long, slender hairs -------- 11. S. setifera.
      - Stems and calyx finely stellate-tomentose ---------- 12. S. cordifolia.

Leaves cuneate to rounded at base, rarely shallowly cordate, never velutinous.
  Carpels each with 2 long retrorsely barbed awns---13. **S. salviaefolia.**
  Carpels not awned, or the awns short and not barbed.
    Leaves linear or linear-oblong.
      Carpels rounded at apex; leaves pubescent on the upper surface. 14. **S. neomexicana.**
      Carpels acute or short-awned; leaves usually glabrous on the upper surface----------15. **S. lindheimeri.**
    Leaves broader than linear-oblong, often ovate.
      Pedicels jointed below the middle; leaves distichous--16. **S. acuta.**
      Pedicels jointed above the middle, or sometimes not jointed; leaves not distichous.
        Flowers chiefly racemose, the subtending leaves bractlike. 17. **S. xanti.**
        Flowers axillary.
          Pedicels much longer than the subtending leaves. 18. **S. potosina.**
          Pedicels all or mostly shorter than the leaves.
            Stems and calyx sparsely hirsute; leaves shallowly cordate at base----------19. **S. tragiaefolia.**
            Stems and calyx not hirsute; leaves cuneate or rounded at base.
              Calyx lobes acute and mucronate; stipules not ciliate. 20. **S. rhombifolia.**
              Calyx lobes cuspidate-acuminate; stipules long-ciliate. 21. **S. corymbosa.**
  Carpels 5 or sometimes 6.
    Flowers densely glomerate in the leaf axils or on the branches of a panicle.
      Leaves hirsute beneath----------22. **S. urens.**
      Leaves stellate-velutinous beneath----------23. **S. aggregata.**
    Flowers solitary in the axils or loosely paniculate, never in dense glomerules.
      Leaves rounded or obtuse at base, rarely subcordate, oblong or linear-oblong ----------24. **S. angustifolia.**
      Leaves cordate at base, usually deeply so, broader than oblong.
        Leaves mostly rounded or obtuse at apex, rarely acute, usually 2 cm. long or less----------25. **S. procumbens.**
        Leaves acuminate or long-acuminate, usually much more than 2 cm. long.
          Leaves very asymmetric at base----------26. **S. decumbens.**
          Leaves symmetric at base.
            Stems viscid-pilose above----------27. **S. glutinosa.**
            Stems usually without viscid pubescence--------28. **S. glabra.**

1. **Sida ciliaris** L. Syst. Nat. ed. 10. 1145. 1759.

Sida muricata Cav. Icon. Pl. **6**: 78. *pl. 597, f. 1.* 1801.

Sinaloa and Jalisco to Oaxaca and Yucatán. Texas, West Indies, Central America, and South America.

Plants chiefly herbaceous and spreading, the branches stellate-strigose; leaves mostly 1 to 2 cm. long, obtuse, rounded at base, serrate, glabrous above, stellate-pubescent beneath; bracts subulate, long-ciliate; petals copper-colored; carpels about 7.

2. **Sida anomala** St. Hil. Fl. Bras. Merid. 1: 177. *pl. 33.* 1825.

Tepic and probably elsewhere. Central America and South America.

Stems chiefly or wholly herbaceous, strigose; leaves 1 to 3 cm. long, obscurely serrate, obtuse or acute, glabrous above; petals purplish.

3. **Sida linifolia** Juss.; Cav. Monad. Diss. 14. *pl. 2, f. 1.* 1785.

Sida longifolia T. S. Brandeg. Zoe 5: 212. 1905.

Sinaloa and Jalisco to Guerrero and Veracruz. West Indies, Central America, South America, and tropical Africa.

Plants chiefly herbaceous, arect, the stems sparsely pilose; leaves short-petiolate, 3 to 9 cm. long, acute, sparsely hirsute or glabrate; flowers pedicellate, in small corymbs or short racemes at the ends of the branches; petals white or yellowish, 7 to 10 mm. long; carpels about 7, not beaked.

4. **Sida lodiegensis** Baker f. Contr. U. S. Nat. Herb. 3: 311. 1895.

Sinaloa; type from Lodiego.

Plants tall and much branched, the stems minutely stellate-pubescent; leaves short-petiolate, 3 to 11 cm. long, alternate, obscurely serrate, sparsely and minutely stellate-pubescent beneath; flowers subracemose; petals about 4 mm. long; carpels 5.

5. **Sida stricta** Standl., sp. nov.

Sinaloa and Tepic; type from Mazatlán, Sinaloa (*Rose, Standley & Russell* 14110; U. S. Nat. Herb. no. 636966).

Stems fruticose below, about 1 meter high, densely stellate-pubescent with fulvous hairs; leaves short-petiolate, 2 to 6 cm. long, acute, thick, serrate, 3-nerved, very densely stellate-tomentose; flowers axillary, the pedicels 1 cm. long or less; calyx lobes acute, densely stellate-pubescent; petals 4 mm. long, bright yellow; carpels 5, not beaked.

6. **Sida pyramidata** Desport.; Cav. Monad. Diss. 11. *pl. 1, f. 10.* 1785.

Sida dumosa Swartz, Prodr. Veg. Ind. Occ. 101. 1788.

Sida hilariana Presl, Rel. Haenk. 2: 107. 1836.

Sida cinerea Baker f. Contr. U. S. Nat. Herb. 3: 311. 1895.

Tepic to Guerrero, Puebla, and Veracruz. West Indies, Central America, and Colombia; type from Santo Domingo.

Slender shrub, 1 to 3 meters high, the branches very minutely stellate-pubescent; leaves long-petiolate, rounded-cordate, 4 to 15 cm. long, abruptly acute or acuminate, crenate or dentate, minutely stellate-pubescent or glabrate; calyx loosely stellate-pubescent and usually pilose; petals yellow, 7 to 8 mm. long; carpels about 7, not beaked.

7. **Sida paniculata** L. Syst. Nat. ed. 10. 1145. 1759.

Veracruz and Oaxaca. West Indies, Central America, and South America.

Slender erect shrub or herb, the branches densely stellate-pubescent with coarse fulvous hairs; leaves short-petiolate, ovate or lance-ovate, 4.5 to 11 cm. long, acuminate, densely pubescent; flowers in loose glabrate panicles, the pedicels filiform; petals red, 3 to 4 mm. long; carpels 5, not beaked.

8. **Sida tehuacana** T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 274. 1912.

Known only from the type locality, Tehuacán, Puebla.

Stems purplish, glabrate; leaves slender-petiolate, ovate or deltoid-lanceolate, 3 to 4 cm. long, acuminate, glabrate; inflorescence loosely paniculate, glabrate, the pedicels filiform; petals purple, 8 mm. long; carpels 7, not beaked.

9. **Sida filipes** A. Gray, Bost. Journ. Nat. Hist. **6**: 164. 1850.

Coahuila, Nuevo León, and Tamaulipas. Texas; type collected near Austin.

Low slender shrub, the branches finely stellate-pubescent; leaves short-petiolate, linear-oblong to lance-oblong, 2 to 7 cm. long, obtuse, cordate at base, crenate; pedicels filform, about as long as the leaves; petals purple, 4 to 5 mm. long; carpels about 8, not beaked.

10. **Sida palmeri** Baker f. Journ. Bot. Brit. & For. **30**: 295. 1892.

Sphaeralcea fruticosa T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 275. 1912.

San Luis Potosí; type collected between San Luis Potosí and Tampico.

Slender shrub, the branches minutely stellate-pubescent; leaves oblong or lance-oblong, 1 to 3.5 cm. long, obtuse or rounded at apex, finely crenate; pedicels very long and slender; petals purple, 10 to 12 mm. long; carpels about 10, not beaked.

11. **Sida setifera** Presl, Rel. Haenk. **2**: 105. 1836.

Sonora to Tepic; type from western Mexico.

Slender shrub, the stems minutely stellate-tomentulose and long-pilose; leaves long-petiolate, broadly ovate-cordate, 1.5 to 7.5 cm. long, acute or obtuse, crenate or dentate, densely stellate-velutinous; flowers short-pedicellate, glomerate; calyx long-pilose; petals yellow, 7 to 8 mm. long; carpels not beaked.

12. **Sida cordifolia** L. Sp. Pl. 684. 1753.

Sonora to Guerrero, Veracruz, and Tamaulipas. West Indies, Central America, South America, and tropical Asia and Africa.

Shrub or herb, the branches stellate-tomentose; leaves long-petiolate, broadly cordate or rounded-cordate, 1.5 to 10 cm. long, acute or obtuse, crenate, often angulate, densely stellate-tomentose, at least beneath; flowers mostly glomerate; petals salmon-pink, 6 to 8 mm. long; carpels not beaked.

In India the roots are reputed to have astringent and tonic properties, and are employed for fevers and nervous and urinary affections. In some parts of Africa they are used as a remedy for rheumatism, because of their supposed diuretic properties. The leaves are employed in India for ophthalmia and the juice of the root for ulcers, and aphrodisiac properties are ascribed to the plant.

13. **Sida salviaefolia** Presl, Rel. Haenk. **2**: 110. 1836.

Sida erecta Macfad. Fl. Jam. **1**: 80. 1837.

Sida holwayi Baker & Rose, Contr. U. S. Nat. Herb. **5**: 176. 1899.

Sinaloa to Guerrero and Morelos. Jamaica, Porto Rico, and Colombia.

Plants chiefly herbaceous, erect, the branches minutely stellate-pubescent; leaves oblong or lance-oblong, 1 to 3 cm. long, obtuse, finely stellate-pubescent beneath, crenate-serrate; flowers subracemose; calyx 5 to 6 mm. long.

14. **Sida neomexicana** A. Gray, Proc. Amer. Acad. **22**: 296. 1887.

Chihuahua to Durango, Jalisco, and San Luis Potosí. Western Texas to southern Arizona; type from Santa Rita, New Mexico.

Stem unusually herbaceous and 30 cm. high or less, minutely stellate-pubescent; leaves 1.5 to 4 cm. long, obtuse or acute, serrate, finely stellate-pubescent but green; flowers pedicellate, borne chiefly at the ends of the branches; petals orange, turning purplish, about 1 cm. long.

15. **Sida lindheimeri** Engelm. & Gray, Bost. Journ. Nat. Hist. **5**: 213. 1845.

Coahuila to Veracruz and Chiapas. Louisiana and Texas; type from Texas.

Stems chiefly herbaceous, minutely stellate-pubescent or glabrate; leaves short-petiolate, 1.5 to 4 cm. long, obtuse or acute, serrate, minutely stellate-

pubescent beneath; flowers long-pedicellate, borne chiefly in the upper axils; petals yellow, 12 to 14 mm. long.

It is this species, probably, which has been reported from Mexico as *S. elliottii* Torr. & Gray.

16. Sida acuta Burm. Fl. Ind. 147. 1768.

Sida carpinifolia L. f. Suppl. Pl. 307. 1781.

Sonora to Tamaulipas, Yucatán, and Oaxaca. Widely distributed in tropical and subtropical regions.

Herb or shrub, sometimes 3 meters high, the stem minutely stellate-pubescent or glabrate; leeaves short-petiolate, lanceolate to elliptic, 2 to 10 cm. long, acute, serrate, green and usually glabrate; stipules linear, green, persistent; flowers axillary, short-pedicellate; petals yellow or nearly white, 8 to 12 mm. long; carpels short-awned or merely acute. "Malva colorada" (Sinaloa); "malva del platanillo" (Veracruz); "chichibé" (Yucatán, Maya); "escoba blanca" (Porto Rico); "escoba," "escobo," "escoba babosa," "escobilla" (Colombia); "malva de caballo" (Cuba); "escobita dulce" (Santa Domingo).

The branches of this and other species of *Sida* are often used in Mexico for making rough brooms. In Yucatán the bark fiber is used for the manufacture of twine and hammocks. The plant is said to furnish good forage for horses and sheep. The leaves and young shoots rubbed in water give a lather which may be used for shaving, especially in the case of a tender and irritable skin. In India the roots are esteemed for their stomachic properties, and they are employed as a remedy for ague, dysentery, intermittent fevers, and snake bites.

17. Sida xanti A. Gray, Proc. Amer. Acad. **22**: 296. 1887.

Baja California and Sinaloa; type from Cape San Lucas, Baja California.

Plants erect, herbaceous or suffrutescent, the branches stellate-pubescent and viscid or glabrate; leaves slender-petiolate, lanceolate or lance-ovate, 3 to 10 cm. long, obtuse to acuminate, dentate, green, sparsely stellate-pubescent beneath; petals 1.5 to 2 cm. long.

18. Sida potosina T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 184. 1911.

Known only from the type locality, Minas de San Rafael, San Luis Potosí.

Stems suffrutescent, 30 to 40 cm. long, stellate-pubescent; leaves short-petiolate, ovate-elliptic, 2 to 3 cm. long, obtuse or rounded at apex, crenate-dentate, stellate-pubescent; pedicels 5 to 9 cm. long; petals yellow, 7 mm. long; carpels not awned.

19. Sida tragiaefolia A. Gray, Bost. Journ. Nat. Hist. **6**: 164. 1850.

Coahuila to Tamaulipas. Western Texas.

Plants chiefly herbaceous; leaves slender-petiolate, oblong or lance-oblong, 1.5 to 5 cm. long, obtuse, coarsely dentate, stellate-pilose beneath; flowers long-pedicellate; petals orange-yellow, 10 to 12 mm. long; carpels mucronate.

20. Sida rhombifolia L. Sp. Pl. 684. 1753.

Nearly throughout Mexico, at least at low altitude. Widely distributed in tropical or subtropical regions.

Plants herbaceous or shrubby, often 2 meters high, the stems minutely stellate-pubescent, leaves short-petiolate, oblong or lanceolate to rhombic-ovate or obovate, 2 to 8 cm. long, obtuse or acute, serrate, usually minutely and densely stellate-tomentulose beneath; petals pale yellow, about 6 mm. long; carpels very shortly awned or merely acute. "Huinari," "huinar," "huinare" (Michoacán, Jalisco); "axocatzin" (*Ramírez*); "escoba amarilla" (Nicaragua); "escobilla" (Costa Rica); "malva de cochino" (Cuba); "tebincha" (Argentina); "limpión" (Peru); "malva" (Santo Domingo).

The leaves are used in some parts of Mexico as a substitute for Chinese tea. The strong fiber of the bark is utilized for various purposes. The plants are much eaten by cattle, and they are very common weeds about houses and in fields. Maiden reports that in Australia fowls are sometimes killed by eating the ripe carpels, the sharp points irritating the digestive canal and causing inflammation. In Costa Rica a decoction of the roots is used as a remedy for infantile diarrhea.

21. Sida corymbosa R. E. Fries, Bull. Herb. Boiss II. **7**: 998. 1907.

Tepic to Veracruz; type from the region of Orizaba, Veracruz.

Plants suffrutescent, the stems stellate-hirsutulous; leaves short-petiolate, oblong or lance-oblong, 3 to 7 cm. long, acute or obtuse, serrate, pilose above, coarsely stellate-pubescent beneath; flowers long-pedicellate; calyx 1 cm. long; petals about 8 mm. long.

This species was reported from Mexico by Hemsley as *S. glomerata* Cav.

22. Sida urens L. Syst. Nat. ed. 10. 1145. 1759.

Veracruz. West Indies, Central America, South America, and tropical Africa.

Stems herbaceous or suffrutescent, hispid; leaves long-petiolate, ovate-cordate or lance-ovate, 2 to 12 cm. long, acuminate, dentate or serrate, green; calyx hispid; petals purplish, little exceeding the calyx; carpels not beaked.

23. Sida aggregata Presl, Rel. Haenk. **2**: 106. 1830.

Guerrero. Panama; reported from Jamaica and Venezuela.

Slender shrub, the branches minutely tomentulose; leaves broadly cordate, 4 to 10 cm. long, acute, crenate; calyx densely long-pilose; petals 4 mm. long; carpels not beaked.

24. Sida angustifolia Lam. Encycl. **1**: 4, 1783.

Sida linearis Cav. Icon. Pl. **4**: 6. *pl. 314, f. 1.* 1797.

Sida hyssopifolia Presl, Rel. Haenk. **2**: 109. 1836.

Tepic to Tamaulipas, Veracruz, and Oaxaca. Texas and Arizona, Central America, South America, and the tropics of the Old World.

Plants herbaceous or frutescent, the stems and leaves minutely stellate-tomentulose; leaves on long or short petioles, acute or obtuse, crenate or serrate; flowers short-pedicellate; petals pale yellow, 4 to 6 mm. long; carpels 2-awned.

This has often been reported from Mexico as *S. spinosa* L.

25. Sida procumbens Swartz, Prodr. Veg. Ind. Occ. 101. 1788.

Sida pilosa Cav. Monad. Diss. **1**: 9. *pl. 1, f. 8.* 1785. Not *S. pilosa* Mill. 1768.

Sida supina L'Hér. Stirp. Nov. **5**: 109 bis. *pl. 52 bis.* 1789.

Sida diffusa H. B. K. Nov. Gen. & Sp. **5**: 257. 1821.

Sida filiformis Moric. Pl. Amer. Rar. 10. *pl. 8.* 1830.

Sonora and Chihuahua to Tamaulipas, Yucatán, and Oaxaca. Texas to Arizona, and in the West Indies, Central America, and northern South America.

Stems chiefly herbaceous and decumbent, stellate-pubescent and usually pilose; leaves ovate-oblong to rounded-ovate, obtuse or rounded at apex, crenate; flowers on filiform pedicels; petals yellow, 6 to 8 mm. long; carpels apiculate or short-beaked.

26. Sida decumbens St. Hil. & Naud. Ann. Sci. Nat. II. **18**: 51. 1842

Guerrero. Guatemala and South America; type from Brazil.

Stems chiefly herbaceous and decumbent, long-pilose; leaves long-petiolate, obliquely ovate-cordate, 2 to 7.5 cm. long, acute or acuminate, crenate, thin, green, sparsely hirsute; petals 6 mm. long; carpels not beaked.

27. Sida glutinosa Commers.; Cav. Monad. Diss. 16. *pl. 2, f. 8.* 1785

Sida endlicheriana Presl, Rel. Haenk. **2**: 111. 1836.

Sonora and Durango to Oaxaca. West Indies, Central America, South America, and tropical Asia and Africa.

Stems herbaceous or suffrutescent, viscid-pilose; leaves ovate-cordate, 2 to 7 cm. long, acute or acuminate, crenate or serrate, thin, green; flowers long-pedicellate; petals yellow or white, 3 to 5 mm. long; carpels not beaked.

28. Sida glabra Mill. Gard. Dict. ed. 8. *Sida* no. 14. 1768.

Sida ulmifolia Cav. Monad. Diss. **1**: 15. *pl. 2, f. 4.* 1785.

Sida arguta Swartz, Prodr. Veg. Ind. Occ. 101. 1788.

Sida alamosana S. Wats. Proc. Amer. Acad. **26**: 133. 1891.

Sonora to Veracruz and Oaxaca. West Indies, Central America, and Venezuela.

Stems chiefly herbaceous, sometimes 2 meters high, usually long-pilose; leaves lanceolate, lance-ovate, or ovate-cordate, 3 to 8 cm. long, acuminate, crenate or serrate, thin, green; flowers long-pedicellate; petals little exceeding the calyx; carpels not beaked. "Escobita dulce" (Porto Rico).

DOUBTFUL SPECIES.

SIDA BRACHYSTEMON DC. Prodr. **1**: 459. 1824. Type from Mexico.

SIDA CARNEA DC. Prodr. **1**: 473. 1824. Type from Mexico.

SIDA COLLINA Schlecht. Linnaea **11**: 364. 1837. Type from Hacienda de la Laguna, Veracruz.

SIDA COSTATA Schlecht. Linnaea **11**: 365. 1837. Type from Hacienda de la Laguna, Veracruz.

SIDA VENUSTA Schlecht. Linnaea **11**: 365. 1837. Type from Tlalpujahua.

11. SPHAERALCEA St. Hil. Fl. Bras. Merid. 1: 209. 1825.

Shrubs or small trees, with stellate pubescence; leaves long-petiolate, shallowly or deeply lobate; flowers large, purplish red, axillary, on long-peduncles; bractlets 3; fruit of numerous carpels, these 2 or 3-seeded, not awned.

Several herbaceous species of the genus occur in Mexico, and some of the species not listed here may become suffrutescent at times, but they are essentially herbaceous.

Bractlets united below the middle, ovate; flowers 5.5 to 6.5 cm. long. **1. S. rosea.**

Bractlets spatulate, distinct; flowers 4 cm. long or shorter.

Bractlets equaling the calyx, gradually narrowed below_____**2. S. crenulata.**

Bractlets shorter than the calyx, abruptly narrowed below into a narrow claw_____**3. S. umbellata.**

1. Sphaeralcea rosea (DC.) Standl.

Malva rosea DC. Prodr. **1**: 435. 1824.

Meliphlea vitifolia Zucc. Abh. Akad. Wiss. München **2**: 359. *pl. 9.* 1832–36.

Malvastrum roseum Hemsl. Biol. Centr. Amer. Bot. **1**: 100. 1879.

Sphaeralcea vitifolia Hemsl. Biol. Centr. Amer. Bot. **1**: 114. 1879.

Michoacán to Chiapas. Guatemala.

Leaves 5 to 18 cm. long, shallowly or deeply lobate, deeply cordate at base, coarsely stellate-tomentose, the lobes acute or acuminate, irregularly crenate-dentate; calyx densely stellate-tomentose, 3 to 4 cm. long; carpels numerous, thin, 2 cm. long.

2. **Sphaeralcea crenulata** T. S. Brandeg. Univ. Calif. Publ. Bot. **3**: 384. 1909.

Known only from the type locality, Cerro de Paxtle, near San Luis Tultitlanapa, Puebla.

Leaves 4 to 6 cm. long, angulate or shallowly lobate, finely stellate-pubescent, the lobes obtuse, irregularly crenate and dentate; calyx 1 to 1.5 cm. long; petals 3 cm. long or less.

3. **Sphaeralcea umbellata** (Cav.) Don, Hist. Dichl. Pl. **1**: 465. 1831.

Malva umbellata Cav. Icon. Pl. **1**: 64. *pl. 95.* 1791.

Sphaeralcea galeottii Turcz. Bull. Soc. Nat. Moscou **31**[1]: 186. 1858.

San Luis Potosí to Puebla.

Shrub or tree, 1.5 to 6 meters high; leaves 6 to 22 cm. long, cordate at base, coarsely stellate-pubescent beneath, shallowly lobate, the lobes acute or acutish, sinuate-dentate; calyx about 2 cm. long; carpels 1.5 cm. long, stellate-hirsute.

12. LAVATERA L. Sp. Pl. 690. 1753.

Shrubs with stellate pubescence; leaves angulate or lobate; peduncles 1-flowered, axillary, solitary or fasciculate; bractlets coalescent, forming a 3 to 6-lobate involucre; carpels numerous, 1-seeded, verticillate about a prominent axis.

An interesting general account of the American species has been published by E. L. Greene.[1] The roots of *L. plebeia* Sims, which somewhat resemble parsnips, are used as food by the natives of Australia. The fiber of the same species was utilized by the aborigines for the manufacture of baskets and fishing lines, and the stems have been tested successfully for paper making.

Leaves glabrous or essentially so ..... 1. **L. venosa.**
Leaves finely stellate-pubescent.
  Axis of the fruit not equaling the carpels ..... 2. **L. assurgentiflora.**
  Axis of the fruit conic, much exceeding the carpels.
    Bractlets more than half as long as the calyx, conspicuously united at base ..... 3. **L. occidentalis.**
    Bractlets less than half as long as the calyx, nearly distinct. 4. **L. insularis.**

1. **Lavatera venosa** S. Wats. Proc. Amer. Acad. **12**: 249. 1877.

Known only from San Benito Island, Baja California.

Shrub, glabrous throughout or nearly so; leaves 7 to 15 cm. long. green, usually 7-lobed, the lobes obtuse, coarsely crenate; petals 4 cm. long, white below, violet above; carpels 4 mm. long.

2. **Lavatera assurgentiflora** Kellogg, Proc. Calif. Acad. **1**: 14. 1854.

Northern Baja California. California; type from Anacapa Island.

Shrub, 3 meters high or less; leaves long-petiolate, 5 to 13 cm. long, finely stellate-pubescent, deeply cordate at base, usually 5-lobate, the lobes irregularly dentate or lobate; peduncles long and slender; bractlets less than half as long as the calyx; petals 3 to 4 cm. long, deep pink, veined with red.

A handsome plant, often cultivated in Mexico (specimens have been seen from the City of Mexico, Puebla, and Veracruz).

3. **Lavatera occidentalis** S. Wats. Proc. Amer. Acad. **11**: 124. 1876.

Known only from Guadalupe Island, Baja California.

Shrub, about a meter high; leaves 7 to 12 cm. long, 7-lobate, the lobes acute or obtuse, coarsely crenate; petals 5 cm. long, whitish, striped with violet; carpels 6 to 10.

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[1] Gard. & For. **3**: 378-379. 1890.

4. **Lavatera insularis** S. Wats. Proc. Amer. Acad. **12**: 249. 1877.

Known only from Coronado Island, Baja California.

Leaves 7 to 15 cm. wide, 7-lobate, the lobes obtuse, coarsely crenate; petals 3 to 4 cm. long, yellowish, striped with purple; carpels about 10.

13. MALVASTRUM A. Gray, Mem. Amer. Acad. n. ser. 4: 21. 1849.

Herbs or shrubs, with stellate pubescence; leaves often lobate; flowers white, yellow, or red, axillary or terminal, each subtended by 1 to 3 bractlets; carpels 5 or more, 1-seeded, indehiscent or bivalvate.

There are several Mexican species which are wholly herbaceous. Those listed here are hardly true shrubs.

Petals 1.5 to 2 cm. long, red or pink.
- Calyx stellate-hispid ..... 1. **M. densiflorum.**
- Calyx finely stellate-pubescent ..... 2. **M. fasciculatum.**

Petals 1 cm. long or less, variously colored.
- Stems strigose, the hairs 4-rayed, the rays in approximate pairs directed forward and backward ..... 3. **M. coromandelianum.**
- Stems with pubescence of branched hairs, the rays usually more than 4, radiately divaricate.
  - Carpels bicuspidate ..... 4. **M. bicuspidatum.**
  - Carpels rounded on the back, not bicuspidate.
    - Carpels strigose or hispid above; leaves not lobate; flowers chiefly in terminal spikes ..... 5. **M. spicatum.**
    - Carpels glabrous, rarely finely stellate-pubescent when young; leaves usually shallowly or deeply lobate; flowers chiefly in axillary clusters.
      - Stems soon glabrous or nearly so ..... 6. **M. lacteum.**
      - Stems densely stellate-pubescent ..... 7. **M. ribifolium.**

1. **Malvastrum densiflorum** S. Wats. Proc. Amer. Acad. **17**: 368. 1882.

Northern Baja California. Southern California; type from San Jacinto Mountains.

Stems 1 meter high or less, suffrutescent; leaves round-cordate, 1.5 to 4 cm. long, obtuse or rounded at apex, crenate-denate, often shallowly trilobate, stellate-pubescent; carpels glabrous.

2. **Malvastrum fasciculatum** (Nutt.) Greene, Fl. Franc. 108. 1891.

Malva fasciculata Nutt.; Torr. & Gray, Fl. N. Amer. **1**: 226. 1838.

Malvastrum thurberi A. Gray, Mem. Amer. Acad. n. ser. **5**: 307. 1855.

Malacothamnus fasciculatus Greene, Leaflets **1**: 208. 1906.

Northern Baja California and Sonora; type from Sonora. Southern Arizona and California.

Herbaceous or shrubby, sometimes 4.5 meters high; leaves rounded-subcordate, 2 to 5 cm. long, obtuse or rounded at apex, often obscurely lobate, finely stellate-pubescent; inflorescence nearly naked; carpels stellate-pubescent.

3. **Malvastrum coromandelianum** (L.) Garcke, Bonplandia **5**: 295. 1857.

Malva coromandeliana L. Sp. Pl. 687. 1753.

Malva tricuspidata Ait. Hort. Kew. ed. 2. **4**: 210. 1812.

Malvastrum tricuspidatum A. Gray, Pl. Wright. **1**: 16. 1852.

Sonora and Chihuahua to Tamaulipas, Yucatán, and Oaxaca. Widely distributed in tropical and subtropical regions.

Plants essentially annual but often becoming fruticose; leaves chiefly rhombic-ovate, often broadly so, 2 to 5 cm. long, obtuse or rounded at apex, usually rounded at base, crenate-dentate, green, thinly strigose; flowers mostly axillary

and solitary, short-pedunculate; petals yellow; carpels hispid. "Escoba blanca," "escobita dulce" (Porto Rico).

4. **Malvastrum bicuspidatum** (S. Wats.) Rose, Contr. U. S. Nat. Herb. **12**: 286. 1909.

Malvastrum tricuspidatum bicuspidatum S. Wats. Proc. Amer. Acad. **21**: 417. 1886.

Chihuahua to Morelos, Oaxaca, and Sinaloa; type from Hacienda San Miguel, Chihuahua.

Plants usually fruticose, about 1 meter high, the stems reddish brown; leaves ovate or broadly ovate, 2 to 7 cm. long, acute, crenate-dentate, green, thinly or densely stellate-pubescent; petals yellow; carpels hispid. "Malva" (Sinaloa).

5. **Malvastrum spicatum** (L.) A. Gray, Mem. Amer. Acad. n. ser. **4**: 22. 1849.

Malva spicata L. Syst. Nat. ed. 10. 1146. 1759.

Jalisco to Nuevo León, Veracruz, and Oaxaca. Widely distributed in tropical regions.

Plants sometimes 2 meters high; leaves rounded-ovate, 2 to 7 cm. long, obtuse, subcordate to obtuse at base, crenate-dentate, stellate-pubescent; calyx hirsute; petals yellow. "Malvavisco" (Port Rico).

6. **Malvastrum lacteum** (Ait.) Standl.

Malva lactea Ait. Hort. Kew. **2**: 448. 1789.

Malva vitifolia Cav. Icon. Pl. **1**: *pl. 30*. 1791.

Malvastrum vitifolium Hemsl. Biol. Centr. Amer. Bot. **1**: 100. 1879.

Michoacán to Veracruz and Oaxaca. Guatemala.

Shrub, 1.5 to 2.5 meters high, the stems sometimes 5 cm. thick; leaves 5 to 12 cm. long, cordate at base, 3 or 5-lobate, the lobes acute or acutish, crenate-dentate, green, sparsely stellate-pubescent; flowers slender-pedicellate, in loose cymes; petals white.

7. **Malvastrum ribifolium** (Schlecht.) Hemsl. Biol. Centr. Amer. **1**: 100. 1879.

Malva ribifolia Schlecht. Linnaea **11**: 351. 1837.

Malva mexicana Schauer, Linnaea **20**: 724. 1847.

Malvastrum mexicanum Hemsl. Biol. Centr. Amer. Bot. **1**: 99. 1879.

Malvastrum schaffneri S. Wats. Proc. Amer. Acad. **25**: 143. 1890.

Malvastrum greenmanianum Rose, Contr. U. S. Nat Herb. **5**: 180. 1899.

Coahuila to Mexico and Oaxaca; type from Mineral del Monte, Hidalgo. Central America.

Stems herbaceous or fruticose, sometimes 2.5 meters high; leaves 4 to 13 cm. long, usually shallowly 3 or 5-lobate, crenate-dentate, stellate-pubescent, the terminal lobe acute; flowers white, sessile or nearly so in dense axillary clusters.

14. **MALACHE** Vogel in Trew, Pl. Select. 50. 1772.

Shrubs or herbs; leaves often shallowly lobate; flowers axillary, paniculate, or subcapitate at the ends of long peduncles; bractlets 5 or more, usually distinct; petals spreading or erect; carpels 5, 1-seeded, often armed with spines, bivalvate or indehiscent.

Carpels with 1 or 3 long, retrorsely barbed awns at apex; leaves not cordate at base.

Carpels smooth on the back ..... 1. M. rosea.

Carpels transverse-rugose on the back.

Bractlets more than twice as long as the calyx ..... 2. M. arachnoidea.

Bractlets about equaling the calyx ..... 3. M. spinifex.

Carpels not awned; leaves cordate at base.
  Petals erect; carpels of the fruit with fleshy pericarp__4. **M. malacophylla.**
  Petals spreading; carpels dry.
    Bractlets lanceolate or ovate.
      Bractlets lanceolate, about twice as long as the calyx__5. **M. chiapensis.**
      Bractlets ovate, equaling or shorter than the calyx__6. **M. nepetaefolia.**
    Bractlets linear.
      Fruit deeply lobed, the carpels scarcely coherent_____7. **M. lasiopetala.**
      Fruit not lobed, the carpels adnate to each other.
        Calyx finely stellate-pubescent; bractlets not ciliate; stamen column with several large appendages at base_____8. **M. melanommata.**
        Calyx hirsute; bractlets long-ciliate; stamen column not appendaged.
          Carpels glabrous or scaberulous_____9. **M. paniculata.**
          Carpels densely pubescent_____10. **M. purpusii.**

1. **Malache rosea** (Schlecht.) Kuntze, Rev. Gen. Pl. 1: 71. 1891.
Pavonia rosea Schlecht. Linnaea 11: 355. 1837.

San Luis Potosí, Veracruz, Oaxaca, and Chiapas; type from Hacienda de la Laguna, Veracruz. West Indies, Central America, and South America.

Shrub, about a meter high, the branches stellate-pubescent; leaves short-petiolate, rhombic-obovate or obovate-oblong, 4 to 18 cm. long, acute or acuminate, dentate, minutely stellate-pubescent; flowers mostly clustered at the ends of long peduncles; bractlets linear; petals pink, about 12 mm. long. "Mozote" (Guatemala).

2. **Malache arachnoidea** (Presl) Kuntze, Rev. Gen. Pl. 1: 70. 1891.
Pavonia arachnoidea Presl, Rel. Haenk. 2: 129. 1836.

Guerrero; type from western Mexico, probably from Acapulco.

Stems slender, stellate-hirsute; leaves long-petiolate, ovate-lanceolate, 3 to 6.5 cm. long, long-acuminate, serrate-dentate, coarsely stellate-pubescent; flowers mostly axillary, long-pedicellate; bractlets subulate, hirsute; petals about 12 mm. long.

3. **Malache spinifex** (L.) Kuntze, Rev. Gen. Pl. 1: 70. 1891.
Hibiscus spinifex L. Syst. Nat. ed. 10. 1149. 1759.
Pavonia spinifex Cav. Monad. Diss. 133. 1787.
Pavonia lanceolata Schlecht. Linnaea 11: 356. 1837.

Veracruz and Oaxaca. Florida, West Indies, Central America, and South America.

Shrub or herb, 0.5 to 4 meters high, the branches pilosulous; leaves short-petiolate, oblong or lonceolate, 2 to 7 cm. long, acute, serrate, thinly pubescent; flowers mostly axillary, long-pedicellate; bractlets linear-lanceolate; petals yellow, 14 to 16 mm. long. "Cadillo espinoso" (Porto Rico); "pajarito amarillo" (Colombia); "cadillo amarillo" (Santo Domingo).

4. **Malache malacophylla** (Nees & Mart.) Standl.
Lopimia malacophylla Nees & Mart. in Curtis's Bot. Mag. *pl. 4365.* 1848.
Pavonia malacophylla Wright; Hemsl. Biol. Centr. Amer. Bot. 1: 117. 1879, as synonym.

Oaxaca. Cuba and South America.

Shrub, the branches densely stellate-tomentose; leaves rounded-cordate, 10 to 18 cm. long, acute or obtuse, often angulate, denticulate, velvety-tomentose; flowers chiefly axillary; bractlets about 18, linear, hirsute; petals purple-red, 3 to 3.5 cm. long.

In general appearance the plant is much like some species of *Malvaviscus.* It was reported by Hemsley as *Pavonia velutina* St. Hil.

5. **Malache chiapensis** Standl., sp. nov.

Type from Jiquipilas, Chiapas (*Goldman* 1037; U. S. Nat. Herb. no. 470832).

Shrub, the branches densely tomentose and somewhat viscid; leaves on long or short petioles, ovate-cordate, 2 to 4.5 cm. long, acute, crenate-dentate, densely-stellate-tomentose, the basal lobes usually overlapping; flowers axillary, long-pedicellate; bractlets usually 6, stellate-tomentose; petals yellow, 2 cm. long; carpels scabrous, somewhat rugose on the back.

6. **Malache nepetaefolia** Standl., sp. nov.

Coahuila and San Luis Potosí; type from General Cepeda, Coahuila (*Pringle* 13698; U. S. Nat. Herb. no. 462390).

Shrub, the branches finely stellate-pubescent; leaves slender-petiolate, deltoid-cordate or deltoid-oblong, 1.5 to 3.5 cm. long, obtuse, deeply cordate at base, coarsely crenate or near the base crenate-lobate, rather thinly stellate-pilosulous; flowers axillary, slender-pedicellate; bractlets usually 6, acute, stellate-pubescent; petals 12 to 14 mm. long; fruit deeply lobed, the carpels lightly coherent, indehiscent, finely pubescent.

7. **Malache lasiopetala** (Scheele) Kuntze, Rev. Gen. Pl. **1**: 70. 1891.

Pavonia lasiopetala Scheele, Linnaea **21**: 470. 1848.

Pavonia wrightii A. Gray, Gen. Fl. Amer. **2**: 76. *pl. 130*. 1849.

Coahuila and Nuevo León; reported from Hidalgo. Western Texas; type from Texas.

Shrub, the branchlets pilosulous; leaves broadly cordate, 3 to 6 cm. long, acute, often angulate, coarsely serrate or dentate, stellate-pilose beneath; flowers axillary, long-pedicellate; petals rose-purple, about 2 cm. long; carpels glabrous.

8. **Malache melanommata** (Robins. & Seat.) Standl.

Pavonia melanommata Robins. & Seat. Proc. Amer. Acad. **28**: 104. 1893.

Michoacán, Guerrero, and Morelos; type from Monte León, Michoacán.

Slender shrub, 1 to 2.5 meters high, the branches finely viscid-pubescent, leaves long-petiolate, ovate or lance-ovate, 5 to 12 cm. long, long-acuminate, cordate at base, crenate, often shallowly trilobate, minutely stellate-pubescent; flowers chiefly axillary, long-pedicellate; petals 2 to 2.5 cm. long, pink, with dark center.

9. **Malache paniculata** (Cav.) Kuntze, Rev. Gen. Pl. **1**: 70. 1891.

Pavonia paniculata Cav. Monad. Diss. **3**: 135. *pl. 46, f. 2*. 1787.

Pavonia mexicana H. B. K. Nov. Gen. & Sp. **5**: 284. 1821.

? *Pavonia scabra* Presl, Rel. Haenk. **2**: 129. 1836.

Veracruz. West Indies, Central America, and South America.

Shrub, 1 to 3 meters high, the branches viscid-pubescent and often hirsute; leaves ovate-cordate, 5 to 12 cm. long, acute or acuminate, often trilobate, crenate or serrate; flowers mostly paniculate; petals yellow, about 1.5 cm. long, pilose within at base.

10. **Malache purpusii** (T. S. Brandeg.) Standl.

Pavonia purpusii T. S. Brandeg. Zoe **5**: 250. 1908.

Pavonia liebmannii Ulbrich, Repert. Sp. Nov. Fedde **13**: 516. 1915.

Veracruz and Oaxaca; type from Zacupan, Veracruz. Guatemala.

Slender shrub, the branches viscid-tomentose and hirsute; leaves ovate-cordate, 3 to 12 cm. long, acute or acuminate, dentate; flowers axillary, long-pedicellate; petals purplish, 1.5 to 2 cm. long.

DOUBTFUL SPECIES.

It would be possible to key out some of the species listed below by the characters given in the original descriptions, but the writer has seen no

material which certainly belongs to them, and it may be that some of the names are referable to other genera.

PAVONIA GLANDULOSA Presl, Rel. Haenk. 2: 129. 1836. Type from western Mexico.

PAVONIA HETEROPHYLLA Turcz. Bull. Soc. Nat. Moscou 31[1]: 189. 1858.

PAVONIA HIRTIFLORA Benth. Pl. Hartw. 7. 1839. Type from Aguascalientes.

PAVONIA RACEMIFLORA Hook. & Arn. Bot. Beechey Voy. 277. 1836–39. Type from Tepic.

PAVONIA URTICAEFOLIA Presl, Rel. Haenk. 2: 128. 1836. Type from western Mexico.

15. MALVAVISCUS Cav. Monad. Diss. 131. 1780.

Shrubs or trees; leaves toothed, often lobed or angled; flowers usualy red, pedunculate, axillary or racemose; bractlets numerous; petals erect-connivent, or spreading only above; fruit 5-celled, the carpels baccate, indehiscent, 1-seeded.

The differences between most of the species are poorly marked, and most of the characters are so variable that there is much doubt as to which ones are of systematic value. The following treatment is not wholly satisfactory, but the writer is uncertain whether the number of recognized species should be increased or decreased.

Various species of *Malvaviscus* are cultivated in Mexico and elsewhere for their showy flowers. Among gardeners they are frequently known by the generic name *Achania*. The bark contains a tough fiber. A decoction of the flowers is employed in Mexico for inflammation of the digestive tract, and in popular practice as an emmenagogue. The plants have the emollient properties characteristic of the family.

One of the species is figured by Hernández,[1] without name or description. Another one, apparently, is illustrated and described[2] in a chapter headed "De Atlat Zopillin, seu aquosa herba appensa."

Corolla 7 to 8 cm. long ..... **1. M. candidus.**
Corolla less than 6 cm. long.
  Leaves glabrous beneath, or the pubescence of separated, simple or stellate hairs.
    Corolla 4 to 5 cm. long.
      Bractlets linear, glabrous ..... **2. M. penduliflorus.**
      Bractlets broadened above, ciliate and usually stellate-pubescent. **3. M. conzattii.**
    Corolla 2 to 3.5 cm. long.
      Pubescence of the upper surface of the leaf almost wholly of simple hairs ..... **4. M. rivularis.**
      Pubescence of the leaves wholly or chiefly of stellate hairs.
        Leaves minutely stellate-pubescent beneath along the nerves. Leaves usually as broad as long, deeply cordate at base. **5. M. drummondii.**
        Leaves coarsely stellate-pubescent along the nerves or hirtellous.
        Leaves mostly 3 to 5-lobate, usually 5 to 14 cm. wide. **6. M. populifolius.**
        Leaves usually not lobate, mostly 1 to 5 cm. wide. **7. M. grandiflorus.**

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[1] Thesaurus 352. 1651.

[2] Thesaurus 117. 1651.

Leaves densely stellate-tomentose beneath with crowded interlaced hairs.
Corolla 1.5 cm. long ..... **8. M. palmeri.**
Corolla 2.5 cm. long or larger.
Petals spreading above ..... **9. M. acerifolius.**
Petals erect.
Pubescence of the lower surface of the leaves and of the bractlets wholly of minute hairs ..... **10. M. oaxacanus.**
Pubescence of the leaves and bractlets partly of coarse spreading hairs.
Leaves minutely stellate-pubescent beneath upon the veins. **5. M. drummondii.**
Leaves coarsely stellate-pilose beneath along the veins. **11. M. arboreus.**

1. **Malvaviscus candidus** DC. Prodr. **1**: 445. 1824.
Malvaviscus pringlei Baker f. Amer. Journ. Sci. **50**: 175. 1895.
Coahuila, Querétaro, Jalisco, and Michoacán.
Shrub or small tree, 2 to 6 meters high; leaves 3 or 5-lobate, 8 to 20 cm. long, cordate at base, the lobes irregularly dentate or crenate, stellate-pubescent; bractlets linear, equaling or shorter than the calyx; petals white. "Lirio" (Coahuila).
The Coahuila specimens were taken from a cultivated plant, and the shrub is cultivated elsewhere in Mexico. Palmer reports that a decoction of the flowers and peach leaves is a local remedy for deafness, and that the flowers are steeped in mescal to prepare a drink for coughs and colds.

2. **Malvaviscus penduliflorus** DC. Prodr. **1**: 445. 1824.
Malvaviscus lanceolatus Rose, Contr. U. S. Nat. Herb. **5**: 175. 1899.
Michoacán to Chiapas.
Shrub, 1.5 to 4 meters high, nearly or quite glabrous throughout; leaves slender-petiolate or the upper nearly sessile, lanceolate to ovate-oblong, 3-nerved, rounded or cordate at base, acuminate, sinuate-serrate; petals red. "Monacillo colorado" (Oaxaca, *Reko*).

3. **Malvaviscus conzattii** Greenm. Field Mus. Bot. **2**: 333. 1912.
Sinaloa to Chiapas and Veracruz; type from Oaxaca. Guatemala.
Shrub; leaves lanceolate to broadly ovate, 5 to 15 cm. long, acute or acuminate, obtuse to subcordate at base, sinuate-serrate, usually not lobate; petals red.

4. **Malvaviscus rivularis** T. S. Brandeg. Zoe **5**: 211. 1905.
Known only from the type locality, Cofradía, Sinaloa.
Leaves lanceolate or oblong-lanceolate, 5 to 9 cm. long, acuminate, serrate-dentate, often shallowly trilobate, the pubescence beneath chiefly of simple hairs; bractlets linear; corolla red, about 3 cm. long. "Media noche."

5. **Malvaviscus drummondii** Torr. & Gray, Fl. N. Amer. **1**: 230. 1838.
Tamaulipas, Veracruz, San Luis Potosí, and Yucatán. Texas.
Shrub, 1.5 to 3 meters high; leaves rounded-cordate, 4 to 9 cm. long, obtuse or acute, usually angulate or shallowly lobate, crenate-dentate; bractlets spatulate-linear; corolla red, 2 to 3.5 cm. long. "Manzanilla" (Veracruz).
The fruit is edible, and is eaten either raw or cooked.

6. **Malvaviscus populifolius** Presl, Rel. Haenk. **2**: 135. 1836.
Colima to Chiapas and Morelos. Guatemala.
Leaves 5 to 20 cm. long, acute or acuminate, rounded or cordate at base, angulate or shallowly lobate, crenate or dentate; corolla red, 3 to 3.5 cm. long.

7. Malvaviscus grandiflorus H. B. K. Nov. Gen. & Sp. **5**: 288. 1821.

Malvaviscus sepium Schlecht. Linnaea **11**: 361. 1837.

Michoacán to Chiapas, Yucatán, and Veracruz; type from Guanajuato. Central America.

Shrub or small tree, 1.5 to 5 meters high; leaves ovate to rounded-ovate, 2.5 to 9 cm. long, acute or acuminate, coarsely crenate or dentate; corolla red, 2.5 to 3.5 cm. long. "Chilmecate" (Guerrero, *Langlassé*); "mazapán," "mosilado" (Veracruz); "aguate" (Guerrero).

This form is the one to which the name *M. arboreus* Cav. has been applied most frequently. Palmer reports that a decoction of the flowers is used as a gargle for sore throat.

8. Malvaviscus palmeri Baker f. Contr. U. S. Nat. Herb. **3**: 313. 1895.

Malvaviscus cinereus Baker f. Journ. Bot. Brit. & For. **37**: 347. 1899.

Tepic and Jalisco; type from Tepic.

Leaves reniform-cordate, 6 to 16 cm. long, acute or acuminate, 3 or 5-lobate, serrate, grayish, finely stellate-pubescent; flowers in long dense racemes; bracts linear.

The two names cited above were based upon the same collection.

9. Malvaviscus acerifolius Presl, Rel. Haenk. **2**: 135. 1836.

Jalisco and perhaps elsewhere; type from western Mexico.

Leaves rounded-cordate, 7 to 15 cm. long, acute, angulate or lobate, crenate, densely stellate-pubescent on both surfaces; flowers subcorymbose; bractlets linear, densely stellate-pubescent.

10. Malvaviscus oaxacanus Standl., sp. nov.

Oaxaca; type collected north of Tuxtepec (*Nelson* 348; U. S. Nat. Herb. no. 1,073,354).

Leaves ovate-cordate or rounded-cordate, 4 to 8 cm. long, acute, deeply cordate at base, crenulate or dentate, often angulate or shallowly trilobate, very minutely stellate-pubescent, becoming glabrate above; flowers axillary; bractlets linear, slightly shorter than the calyx, minutely stellate-pubescent; corolla red, 2.5 to 3 cm. long.

11. Malvaviscus arboreus Cav. Monad. Diss. 131. *pl. 48, f. 1.* 1780.

Malvaviscus acapulcensis H. B. K. Nov. Gen. & Sp. **5**: 288. 1821.

Malvaviscus mollis DC. Prodr. **1**: 445. 1824.

Sinaloa to Chiapas, Campeche, and Veracruz; type from Mexico. Central America and Colombia.

Shrub; leaves ovate to reniform-cordate, 5 to 16 cm. long, obtuse to acuminate, rounded to deeply cordate at base, crenate or dentate, often angulate or shallowly lobate, densely stellate-pubescent; bractlets linear; corolla red. "Monacillo" (Veracruz, Colima, Jalisco, Durango, Mexico, Oaxaca); "manzanita" or "manzanito" (fruit; Colima, Guatemala); "mazapán" (Mexico); "civil" (Veracruz, Tabasco); "amapola" (Costa Rica); "clavel encarnado," "estrella de Panamá" (Guatemala); "quesillo" (Nicaragua); "manzanita quesillo" (El Salvador).

The vernacular names are chiefly derived from literature, and doubtless are applied indiscriminately to all the red-flowered species.

DOUBTFUL SPECIES.

MALVAVISCUS FLAVIDUS DC. Prodr. **1**: 446. 1824. Type from Mexico.

MALVAVISCUS PENTACARPUS DC. Prodr. **1**: 445. 1824. Type from Mexico.

MALVAVISCUS PLEURANTHERUS DC. Prodr. **1**: 446. 1824. Type from Mexico.

MALVAVISCUS PLEUROGONUS DC. Prodr. **1**: 446. 1824. Type from Mexico.

16. KOSTELETZKYA Presl, Rel. Haenk. 2: 130. 1836.

Plants herbaceous or suffrutescent, the pubescence chiefly of stellate hairs; leaves often angulate or lobate; flowers axillary or paniculate; petals erect or spreading; bractlets 7 to 10; capsule 5-angulate, the cells 1-seeded.

Probably none of the species deserve to be classed as shrubs.

Petals erect, convolute, 2 to 3.5 cm. long.
- Stems hispid ..... **1. K. paniculata.**
- Stems minutely stellate-pubescent.
  - Capsule hispid; leaves not lobed ..... **2. K. malvaviscana.**
  - Capsule glabrate except on the angles; leaves motly 3-lobed ..... **3. K. thurberi.**

Petals spreading, usually less than 2 cm. long.
- Pubescence of the stems chiefly of long simple hairs, very few, if any, small stellate hairs present.
  - Leaves, at least the upper ones, 3 to 5-lobed nearly or quite to the base. **4. K. coulteri.**
  - Leaves, at least the upper ones, not lobed, the lower ones angulate or shallowly lobed ..... **5. K. hastata.**
- Pubescence of the stems of stellate hairs, these mostly very small.
  - Upper leaves mostly or 3 or 5-parted ..... **6. K. digitata.**
  - Upper leaves not lobed or merely hastate-lobed ..... **7. K. sagittata.**

1. Kosteletzkya paniculata Benth. Pl. Hartw. 285. 1848.

Sonora, Sinaloa, and Jalisco; type from Bolaños, Jalisco.

Shrub or herb, 1 to 2 meters high, the stems and leaves coarsely hispid; leaves long-petiolate, broadly cordate, 10 to 20 cm. long, most of them shallowly or deeply 3 to 7-lobed; flowers in large panicles; petals white (?); seeds glabrous.

2. Kosteletzkya malvaviscana Rose, Contr. U. S. Nat. Herb. 8: 319. *pl. 67.* 1905.

Known only from the type locality, Las Cuevas, Sonora.

Plants 1 to 2 meters high; leaves broadly ovate, 5 to 7 cm. long, acute, crenate-dentate, minutely stellate-pubescent, rounded at base; petals purple-pink.

Probably a form of *K. thurberi.*

3. Kosteletzkya thurberi A. Gray, Proc. Amer. Acad. 22: 314. 1887.

Known only from the type locality, Cocospera, Sonora.

Plants 1.5 to 3 meters high; leaves rounded-cordate, angulate, stellate-pubescent, serrulate; flowers in naked panicles; petals rose-colored.

4. Kosteletzkya coulteri A. Gray, Pl. Wright. 1: 23. 1852.

Sonora and Sinaloa; type from Sonora.

Plants chiefly or wholly herbaceous, a meter high; leaves long-petiolate, 3 to 8 cm. long, the lobes narrow, coarsely serrate; petals white or yellow, 13 mm. long; seeds glabrous.

5. Kosteletzkya hastata Presl, Rel. Haenk. 2: 130. 1836.

Kosteletzkya hispida Presl, Rel. Haenk. 2: 132. 1836.

Kosteletzkya cordata Presl, Rel. Haenk. 2: 132. 1836.

Hibiscus tampicensis Moric. Mém. Soc. Phys. Hist. Nat. Genève 7: 260. *pl. 14.* 1833.

Kosteletzkya tampicensis Rose, Contr. U. S. Nat. Herb. 8: 319. 1905.

Kosteletzkya violacea Rose, Contr. U. S. Nat. Herb. 5: 319. *pl. 68.* 1905.

Sonora to Tamaulipas and Morelos. Nicaragua.

Stems chiefly herbaceous; leaves on long or short petioles, lance-oblong to broadly cordate, 3 to 7 cm. long. dentate, often shallowly lobate or hastate-lobate; petals 10 to 13 mm. long, yellow or purplish; seeds minutely pubescent.

The specimens placed here show great variation in leaf form, but the variation upon a single plant is nearly as great as in the whole series of specimens.

6. **Kosteletzkya digitata** A. Gray, Proc. Amer. Acad. **8**: 289. 1870.

Known only from the type locality, Yaqui River, Sonora.

Leaves with linear denticulate lobes, or some of the leaves simple; flowers long-pedicellate, purplish, 8 to 10 mm. long; seeds glabrous.

7. **Kosteletzkya sagittata** Presl, Rel. Haenk. **2**: 131. *pl. 70*. 1836.

Kosteletzkya stellata Fernald, Bot. Gaz. **20**: 532. 1895.

Sinaloa to San Luis Potosí, Veracruz, and Guerrero. Reported from the West Indies and northern South America.

Leaves very variable, from linear-oblong to deltoid, often hastate-lobate or even 3 or 5-lobate, serrate or dentate, green; petals white or pink; seeds minutely pubescent.

DOUBTFUL SPECIES.

KOSTELETZKYA MADRENSIS Jones, Contr. West. Bot. **12**: 4. 1908.

17. HIBISCUS L. Sp. Pl. 693. 1753.

REFERENCE: Hochreutiner, Revision du genre *Hibiscus*, Ann. Cons. Jard. Genève **4**: 23–191. 1900.

Shrubs or small trees, sometimes herbs, the pubescence chiefly of stellate hairs; leaves often lobed or parted; flowers chiefly axillary, of various colors; bractlets usually numerous; fruit a 5-valvate capsule; seeds glabrous or hairy.

Hibiscus manihot L., a species with large yellow flowers and with leaves divided into narrow lobes, is sometimes cultivated in Mexico under the names "pajiza" and "viudas." The okra ("chimbombo," "quimgombo"), *Hibiscus esculentus* L., also is cultivated.

Bractlets bifurcate at the apex.
- Stems and petioles aculeolate ---- **1. H. bifurcatus.**
- Stems and petioles not aculeolate.
  - Leaves stellate-hispid beneath ---- **2. H. costatus.**
  - Leaves minutely stellate-pubescent beneath ---- **3. H. furcellatus.**

Bractlets not bifurcate.
- Petals red, erect, convolute. Corolla 2 to 3.5 cm. long.
  - Bractlets spatulate, obtuse ---- **4. H. nelsoni.**
  - Bractlets linear, acute.
    - Leaves rounded or broadly cuneate at base, not lobate ---- **5. H. spiralis.**
    - Leaves truncate or subcordate at base, usually shallowly hastate-lobate. **6. H. tubiflorus.**
- Petals not red, spreading.
  - Bractlets 2.3 to 8 mm. wide, ovate, lanceolate, spatulate, or broadly linear.
    - Leaves glabrous beneath or essentially so, all or most of them deeply lobate ---- **7. H. sabdariffa.**
    - Leaves densely pubescent beneath, very shallowly or usually not at all lobate.
      - Bractlets united to the middle or higher ---- **8. H. tiliaceus.**
      - Bractlets free or nearly so.
        - Flowers 5.5 to 6 cm. long; bractlets broadly linear; leaves mostly 7 to 25 cm. wide ---- **9. H. clypeatus.**
        - Flowers 2.5 to 3.5 cm. long; bractlets spatulate, or lanceolate and contracted at base; leaves mostly 2 to 7 cm. wide.
          - Bractlets spatulate, obtuse; calyx about 12 mm. long. **10. H. lavateroides.**
          - Bractlets lanceolate, acuminate; calyx about 20 mm. long. **11. H. cardiophyllus.**

Bractlets narrowly linear or setaceous, less than 2 mm. wide.
Petals 6 to 8 cm. long; leaves glabrous or nearly so__12. **H. rosa-sinensis.**
Petals 5 cm. long or less; leaves usually copiously pubescent.
Bractlets less than half as long as the calyx_____13. **H. denudatus.**
Bractlets nearly or quite as long as the calyx, often much longer.
Stems hispid with long, mostly simple hairs, and with 2 lines of fine pubescence_____14. **H. biseptus.**
Stems glabrous or with short pubescence of stellate hairs, these evenly distributed.
Petals purple or purplish_____15. **H. brasiliensis.**
Petals white, yellow, or yellowish.
Petals about 1 cm. long; leaves not lobate____16. **H. purpusii.**
Petals 3 to 5 cm. long; leaves usually lobate.
Capsule strigose_____17. **H. ribifolius.**
Capsule glabrous.
Leaves all or partly 3-parted_____18. **H. coulteri.**
Leaves merely dentate, or shallowly lobate.
Leaves 1 to 3 cm. long, obtuse or rounded at apex, the pubescence of the lower surface chiefly of 4 or 5-rayed loose hairs_____19. **H. elegans.**
Leaves mostly 3 to 5 cm. long, acute or acuminate, the pubescence of the lower surface of 3-rayed appressed hairs_____20. **H. acicularis.**

1. **Hibiscus bifurcatus** Cav. Monad. Diss. 146. *pl. 51, f. 1.* 1787.
Hibiscus uncinellus DC. Prodr. 1: 449. 1824.
Tepic to Chiapas and Veracruz. West Indies, Central America, and South America; type from Brazil.
Shrub or herb, 1 to 4.5 meters high, the stems hispid and aculeolate; leaves 6 to 18 cm. long, hirsute and stellate-pubescent, aculeolate beneath along the veins, usually deeply trilobate, the lobes acuminate, serrate; calyx 1.5 to 2 cm. long; petals 7 to 9 cm. long, purplish; capsule strigose. "Flor de paisto" (Michoacán, Guerro, *Langlassé*).
The leaves are slightly acid, and in Brazil they are cooked and eaten.

2. **Hibiscus costatus** A. Rich. Ess. Fl. Cuba 138. 1845.
Hibiscus australis Rose; Donn. Smith, Enum. Pl. Guat. 6: 4. 1903, nomen nudum.
Veracruz and Oaxaca. Cuba and Guatemala; type from Cuba.
Shrub or herb, 1 to 1.5 meters high, the branches stellate-hispidulous or glabrate; leaves ovate-cordate to reniform-cordate, 3.5 to 10 cm. long, acuminate, dentate, often angulate or shallowly lobate; calyx 1.8 to 2 cm. long; petals 6.5 to 7.5 cm. long, lavender or deep pink; capsule strigose.

3. **Hibiscus furcellatus** Desr.; Lam. Encycl. 3: 358. 1789.
Veracruz. Florida, West Indies, Central America, and South America.
Shrub, 1 to 2 meters high, the stems stellate-tomentose; leaves ovate-cordate or orbicular-cordate, 5 to 12 cm. long, acute or obtuse, dentate, often angulate or shallowly lobate; calyx 1.5 to 2 cm. long; petals 6 to 8 cm. long, purple-pink; capsule strigose.

4. **Hibiscus nelsoni** Rose & Standl., sp. nov.
Type collected between Nopala and Mixistepec, Oaxaca (*Nelson* 2430; U. S. Nat. Herb. No. 1,073,355).
Leaves deltoid-lanceolate, 2.5 to 5.5 cm. long, long-acuminate, rounded or truncate at base, serrate-dentate, stellate-hispidulous with fulvous hairs;

flowers axillary; bractlets about 3 mm. wide; calyx 1 cm. long, strigose, the lobes rounded at the apex; petals 2 cm. long, stellate-hispidulous; stamen column exserted; capsule strigose or glabrate.

5. **Hibiscus spiralis** Cav. Icon. Pl. **2**: 47. *pl. 162.* 1793.

State of Mexico and probably elsewhere; described from plants cultivated at Madrid.

Shrub, the branches soon glabrate; leaves lanceolate or ovate, 1.5 to 3 cm. long, acute, coarsely crenate-serrate, thinly and minutely stellate-pubescent; calyx about 12 mm. long; petals 2 to 2.5 cm. long; stamen column exserted; capsule strigose.

6. **Hibiscus tubiflorus** DC. Prodr. **1**: 447. 1824.

Abelmoschus achanioides Turcz. Bull. Soc. Nat. Moscou **31**[1]: 196. 1858.

Hibiscus achanioides Hemsl. Biol. Centr. Amer. Bot. **1**: 121. 1879.

Tamaulipas to Yucatán, Tabasco, and Chiapas. Southern Florida, West Indies, and Guatemala.

Slender shrub; leaves deltoid-lanceolate or deltoid-ovate, 2 to 5 cm. long, acute or obtuse, coarsely crenate-dentate, thinly stellate-hispid; calyx 6 to 15 mm. long; petals 2.5 to 3.5 cm. long; stamens slightly or not at all exserted; capsule stellate-hispidulous. "Hol," "xtupkinil" (Yucatán, Maya); "monacillo del río" (Mexico, *Urbina*).

7. **Hibiscus sabdariffa** L. Sp. Pl. 695. 1753.

Cultivated in Mexico and doubtless also growing without cultivation. Native of the East Indies; often cultivated and naturalized in tropical America.

Slender shrub or herb, 1 to 2 meters high, with red glabrous stems; leaves deeply 3 or 5-lobate, the lobes serrulate, the costa bearing a large gland beneath near the base; calyx 2 cm. long; petals 4 to 5 cm. long, pink or purplish; capsule strigose. "Jamaica," "flor de Jamaica" (Mexico); "viña," "agrio de Guinea" (Porto Rico).

The English names are "roselle" and "Jamaica sorrel." The plant is often cultivated for the fleshy red calyces, which are mucilaginous, with acid flavor, and are used in the preparation of jellies and sauces. The leaves also are sometimes used for flavoring food. In India the plant is of importance because of the fiber of the stems, which is separated by retting and employed for cordage. The seeds are said to have demulcent, diuretic, and tonic properties, and the calyces are employed in the preparation of cooling beverages for fever patients.[1]

8. **Hibiscus tiliaceus** L. Sp. Pl. 694. 1753.

Hibiscus elatus Swartz, Prodr. Veg. Ind. Occ. 103. 1788.

Hibiscus azanzae DC. Prodr. **1**: 454. 1824.

Hibiscus bracteosus DC. Prodr. **1**: 455. 1824.

Paritium tiliaceum Juss.; St. Hil. Fl. Bras. Merid. **1**: 198. 1825.

On seacoasts, Tepic to Oaxaca; reported from Veracruz. Widely distributed in tropical regions.

Shrub or small tree, usually 2 to 5 meters high, with large stipules; leaves ovate-cordate to reniform-cordate, 6 to 18 cm. long, abruptly short-acuminate, entire or nearly so, green above, pale beneath and stellate-tomentulose; calyx 2 to 2.5 cm. long; petals yellow, turning greenish when dry, 6 to 7 cm. long; capsule densely pubescent. "Holó," "xtoló" (Yucatán, Maya); "majahua," "majagua," "masahua," "mazahua" (Oaxaca, Veracruz, Guerrero, Venezuela.

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[1] See P. J. Wester, Contributions to the history and bibliography of the roselle, Bull. Torrey Club **38**: 91–98. 1911.

Nicaragua, Cuba, Costa Rica, Porto Rico, Santo Domingo, Peru, Panama); "emajagua" (Porto Rico, Peru); "huamaga" (Ecuador); "damajagua" (Peru); "algodoncillo" (Venezuela); "demajagua," "majagua azul," "majagua macho" (Cuba); "majagüito de playa" (Colombia); "majagua de playa" (Panama); "nau" (Hawaii); "fau" (Samoa); "pago" (Guam).

The word "majagua" has been corrupted in English into "mahoe," the name used in Jamaica and elsewhere. The wood is white, soft, and porous, and is said to weigh 35 to 38 pounds per cubic foot. It is sometimes utilized as a substitute for cork. The plant was an important source of fiber in the Western Hemisphere before the arrival of the Europeans, and is still used extensively for cordage. It was employed in many parts of the Tropics for the manufacture of mats and coarse cloth. In quality the fiber is similar to jute, and it has the property of becoming stronger after being soaked in water. To the flowers, roots, and bark are ascribed aperitive, emollient, sudorific, and laxative properties. In the Pacific islands the bark was sometimes eaten when other food was lacking. The aborigines of Queensland value the roots as food, likewise the leaves, which have a slightly acid flavor. In Samoa the bark is used for straining the narcotic drink *ava*. In Guam ropes of it, after having been oiled, are employed as cables. For an illustration of the plant see Contr. U. S. Nat. Herb. 8: *pl. 50*.

9. **Hibiscus clypeatus** L. Syst. Nat. ed. 10. 1149. 1759.

Hibiscus berlandierianus Moric. Pl. Amer. Rar. 8. *pl. 6*. 1830.

Veracruz, Campeche, and Yucatán. Greater Antilles.

Shrub or small tree, 3 to 6 meters high, branches stellate-tomentose; leaves rounded-cordate, 8 to 24 cm. long, acute, obscurely dentate or nearly entire, usually angulate, densely stellate-pubescent; calyx about 4 cm. long, nearly equaling the petals; capsule densely hispid, about 4 cm. long. "Huevo de gato" (Porto Rico).

10. **Hibiscus lavateroides** Moric. Pl. Amer. Rar. 9. *pl. 7*. 1830.

Tamaulipas and Veracruz; type from Tampico, Tamaulipas.

Leaves broadly ovate or ovate-cordate, 2 to 7 cm. long, obtuse or acute, dentate, stellate-hispidulous; petals pink or purplish, 2.5 to 3.5 cm. long; capsule stellate-pubescent, 12 to 15 mm. long.

11. **Hibiscus cardiophyllus** A. Gray, Pl. Wright. 1: 22. 1852.

Coahuila, Nuevo León, Tamaulipas, San Luis Potosí, and Puebla. Western Texas; type from Turkey Creek.

Shrub or herb, 30 to 60 cm. high, the stems stellate-hispidulous; leaves rounded-cordate, 3 to 7 cm. long, obtuse, sinuate-dentate, sometimes angulate, pale beneath and densely stellate-tomentose; petals crimson, about 3 cm. long; capsule glabrous or nearly so.

12. **Hibiscus rosa-sinensis** L. Sp. Pl. 694. 1753.

Common in cultivation and often growing without cultivation. Probably native of China, but now widely dispersed in tropical countries.

Shrub or small tree, nearly or quite glabrous throughout; leaves ovate or broadly ovate, 5 to 15 cm. long, acute or acuminate, coarsely crenate-dentate; stamen tube exserted. "Tulipán" (Yucatán); "tulipán rojo" (Oaxaca); "rosa china," "gallardete" (Oaxaca); "obelisco" (Mexico, Jalisco, Durango); "súchil" (*Ramírez*); "clavel" (Guatemala); "resucitado," "escandalosa roja" (Colombia); "Mar Pacífico" (Cuba, Honduras); "pavona," "amapola," "mapola," "candelada" (Porto Rico); "clavelón" (El Salvador); "bonche" (Colombia).

The Chinese hibiscus is one of the most common ornamental shrubs in tropical America, and is cultivated also in hothouses in temperate regions. The flowers are often double, and they occur in many shades of red and yellow, some forms having variegated petals. In India the shrub is known as "China-rose," "shoeblack-plant," or "shoe-flower plant." The latter names are derived from the fact that the petals, which turn black when crushed, are used for blacking shoes. They are employed by the women of China to dye the hair and eyebrows. The flowers are sometimes pickled and eaten in China, and they are used to color spirituous liquors. The petals impart to paper a bluish purple tint which reacts like litmus. The bark is employed in China as an emmenagogue.

A related species (known in Porto Rico as "lira" and in Colombia and the Philippines as "araña") is *H. schizopetalus* (Mast.) Hook., which likewise is cultivated in Mexico. It is distinguished by having recurved petals which are cut into narrow lobes. Still another species cultivated in Mexico is the Rose-of-Sharon or althea, *Hibiscus syriacus* L. ("altea," "flor de una hora"), an Asiatic plant. It is similar to *H. rosa-sinensis*, but has mostly smaller flowers, single or double, pink, purple, or white, with a very short stamen column.

13. Hibiscus denudatus Benth. Bot. Voy. Sulph. 7. *pl. 3.* 1844.

Hibiscus denudatus involucellatus A. Gray, Pl. Wright. **1**: 22. 1852.

Baja California to Durango, Coahuila, and Chihuahua; type from Magdalena Bay, Baja California. Western Texas to Arizona.

Plants herbaceous or suffrutescent, 30 to 60 cm. high; leaves rounded-ovate or oblong-ovate, 1 to 3.5 cm. long, rounded or obtuse at apex, rounded or subcordate at base, sinuate-dentate, finely stellate-pubescent; calyx 8 to 14 mm. long; petals 2 to 2.5 cm. long, lavender-purple; capsule glabrous or nearly so.

14. Hibiscus biseptus S. Wats. Proc. Amer. Acad. **21**: 418. 1886.

Baja California to Chihuahua, Jalisco, and Sinaloa; type from Hacienda San Miguel, Chihuahua.

Stems herbaceous or suffrutescent, 1 meter high or less, in age sometimes glabrous; leaves 1.5 to 7 cm. long, the upper ones deeply lobed, the lower ones often merely crenate-dentate, thinly stellate-hispidulous or nearly glabrous; calyx 1.5 to 2.5 cm. long; petals 3 to 4.5 cm. long, white or pale yellow, with purple spot at base; capsule glabrous.

15. Hibiscus brasiliensis L. Sp. Pl. ed. 2. 977. 1763.

Hibiscus phoeniceus Jacq. Hort. Bot. Vind. **3**: 11. *pl. 14.* 1776.

Hibiscus oxyphyllus DC. Prodr. **1**: 455. 1824.

Hibiscus violaceus T. S. Brandeg. Zoe **5**: 211. 1905.

Hibiscus iochromus T. S. Brandeg. Univ. Calif. Publ. Bot. **3**: 385. 1909.

Chihuahua to Sinaloa, Oaxaca, and Veracruz. West Indies, Central America, and South America.

Slender shrub, 1 to 2 meters high, the branches soon glabrate; leaves deltoid-lanceolate or deltoid-ovate, 3 to 8 cm. long, long-acuminate, coarsely crenate-dentate, often deeply lobate, thinly stellate-hispidulous or glabrate; bractlets shorter or often much longer than the calyx; petals 1 to 2 cm. long; capsule strigose. "Mírame-linda" (Nicaragua); "peregrina" (Cuba); "cadillo" (Santo Domingo).

16. Hibiscus purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 368. 1917.

Known only from the type locality, Zacuapan, Veracruz.

Tree; leaves oblong-lanceolate, 5 to 10 cm. long, cuspidate-acuminate, obtuse or rounded at base, serrate, nearly glabrous; flowers nearly sessile; petals greenish yellow; capsule stellate-hirsute.

17. **Hibiscus ribifolius** A. Gray, Proc. Amer. Acad. 5: 154. 1861.

Baja California; type from Cape San Lucas.

Shrub, 1 to 2.5 meters high, the branches stellate-pubescent; leaves deltoid-ovate, 2 to 5.5 cm. long, acute or acuminate, coarsely serrate-dentate, often subhastate, soon glabrate; petals sulphur-yellow, 2.5 to 3.5 cm. long.

18. **Hibiscus coulteri** Harv.; A. Gray, Pl. Wright. 1: 23. 1852.

Sonora and Chihuahua to Hidalgo; type from Zimapán, Hidalgo.

Shrub, 1 meter high or less, or often herbaceous; leaves dimorphous, the lower ones rounded-ovate or ovate-oval and dentate, the upper ones mostly parted into 3 narrow dentate lobes; petals white or pale yellow, 2 to 4 cm. long.

It is probable that the proper name for this species is *H. acetosaefolius* DC.[1] The plate of Sessé and Mociño[2] upon which that name was based agrees very well with specimens of *H. coulteri*, except for the small size of the flowers, as illustrated.

19. **Hibiscus elegans** Standl., sp. nov.

Hidalgo, Puebla, and Oaxaca; type from Tehuacán, Puebla (*Pringle* 7505; U. S. Nat. Herb. No. 305765.)

Shrub, the branches stellate-strigose; leaves elliptic to oval or ovate-rhombic, 1 to 3 cm. long, rounded or obtuse at apex, rounded or broadly cuneate at base, crenate-dentate, green, stellate-hispidulous; calyx 1.5 to 2 cm. long, the lobes linear-lanceolate; bractlets shorter than the calyx; petals 3 to 4 cm. long, yellow, with red spot at base.

20. **Hibiscus acicularis** Standl., sp. nov.

Tamaulipas and Nuevo León; type from Monterrey, Nuevo León (*Pringle* 13880; U. S. Nat. Herb. No. 462430).

Stems herbaceous or suffrutescent, 60 cm. high, stellate-strigose; leaves hastate-deltoid, obtuse to long-acuminate, crenate or serrate, green, thin, sparsely pubescent with mostly 3-rayed and appressed hairs; flowers long-pedunculate; bractlets equaling or longer than the calyx; calyx 1.5 to 2.5 cm. long, the lobes linear-lanceolate; petals 3 to 4 cm. long, white or pale yellow; seeds covered with long silky hairs. "Amor de un día" (Tamaulipas).

DOUBTFUL SPECIES.

Hibiscus cyanogynus DC. Prodr. 1: 455. 1824. Described from Mexico. Probably not of this genus.

18. GOSSYPIUM L. Sp. Pl.

Reference: George Watt, The wild and cultivated cotton plants of the world, 1907.

Shrubs or large herbs, sometimes small trees; leaves usually 3 to 9-lobed; flowers large, yellow or purplish, the calyx subtended by 3 large cordate bracts; calyx truncate or shallowly 5-lobate; fruit a loculicidal capsule, the seeds commonly covered with long cotton.

The cultivated species of the genus are greatly confused and poorly understood. This is due chiefly to the fact that many of the cultivated forms are the result of hybridization.

Cotton is, of course, one of the most important plants of Mexico, where it has been in cultivation from ancient times. The early European visitors men-

[1] Prodr. 1: 455. 1824.

[2] DC. Calq. Dess. Fl. Mex. *pl. 79.*

tion frequently the cotton garments worn by the natives, who showed great skill in their manufacture. Cotton is now one of the most valuable of cultivated crops in Mexico.

The general Spanish word for cotton is "algodón." This is frequently modified by various varietal names. The name for the plant is "algodonero." The following additional names are reported: "Taman" (Yucatán, Maya); "xurata" (Michoacán); "xchup" (Yucatán, Maya); "cuinim" (Huastec); "ichcatl" (Nahuatl); "tûdŷ," "dehti" (Otomí, *Buelna*); "pishm" (cotton), "pishten-kiup" (the plant), "pishten-puih" (the flower), "pishten" (cotton) (Mixe, *Belmar*).

The root bark of cultivated cotton is official in the U. S. Pharmacopoeia. It has emmenagogue properties and is sometimes employed to facilitate parturition, but at present it is little used. By the slaves of the South in former days it was employed as a means of producing abortion. The plant is said to be used in Mexico for the same purposes, an infusion of the leaves and flowers is employed as a gargle for sore throat, and an infusion of the roasted seeds for dysentery and similar affections.

Besides the fiber obtained from the cotton plant, a valuable product is found in the seeds. These yield an oil which is applied to a wide variety of uses, and the residue left after the extraction of oil is an important source of fertilizer and of food for stock.

Bractlets entire, united below_____1. **G. gossypioides.**
Bractlets toothed or lobed or, if entire (in one species), free.
Seeds covered with very short and close hairs or nearly glabrous, never with long wool. Bractlets free.
Bractlets incised; leaves entire, stellate-velutinous_____2. **G. davidsonii.**
Bractlets entire; leaves mostly lobed, glabrous or nearly so. **3. G. harknessii.**
Seeds with long loose wool, sometimes also with a close covering of short hairs.
Seeds covered with long, loose, easily detachable hairs, without a covering of short hairs. Leaves glabrous or nearly so_____4. **G. barbadense.**
Seeds with a double coat, consisting partly of short matted hairs and partly of long, not easily detachable hairs.
Leaves entire, or deeply lobed (three-fourths the distance to the base or more), the lobes mostly narrowly oblong and often constricted below; petals usually not purple on the claws.
Leaves all entire_____5. **G. lanceolatum.**
Leaves 3 or 5-lobed.
Flowers about 3 cm. long_____6. **G. palmerii.**
Flowers about 6 cm. long.
Leaves subcordate at base; fuzz of the seeds brown. **7. G. schottii.**
Leaves deeply cordate at base; fuzz of seeds usually greenish. **8. G. microcarpum.**
Leaves 3 to 7-lobed, the lobes usually extending less than halfway to base, broad, not constricted below; petals usually purple on the claws.
Leaves glabrous, with 3 to 7 radiating lobes_____9. **G. mexicanum.**
Leaves pilose, usually with 3 ascending lobes_____10. **G. hirsutum.**

1. Gossypium gossypioides (Ulbrich) Standl.

Selera gossypioides Ulbrich, Verh. Bot. Ver. Brand. **55**: 51. 1913.

Oaxaca; type from San Bartolo Yautepec.

Shrub; leaves cordate at base, 3-lobed to about the middle, 8 to 13 cm. long, glabrous except along the veins; the lobes ovate-lanceolate, very long-acuminate; bractlets ovate-cordate, acute, entire, covered with large purple dotlike glands; calyx 8 to 9 mm. long, purple-dotted; petals 5 to 5.5 cm. long, purplish when dry.

In a general way the specimens agree with a tracing of the plate which served as the basis of De Candolle's description of *Ingenhouzia triloba.*[1] The writer feels convinced, however, that the two plants are different. The identification of *Ingenhouzia* is still uncertain, and it may well be that the plant has never been recollected. By many authors it has been held to be the same as *Thurberia thespesioides* A. Gray, but that view is undoubtedly incorrect.

2. **Gossypium davidsonii** Kellogg, Proc. Calif. Acad. **5**: 82. 1873.

Southern Baja California and western Sonora.

Shrub, 1 to 2.5 meters high; leaves broadly ovate-cordate, 2.5 to 6.5 cm. long, acute or acuminate, rarely shallowly trilobate; petals 3 to 3.5 cm. long, bright yellow, with purple claws; bractlets densely stellate-pubescent.

Watt states that this is probably identical with *G. klotzschianum* Anderss., a native of the Galápagos Islands.

3. **Gossypium harknessii** T. S. Brandeg. Proc. Calif. Acad. II. **2**: 136. 1889.

Ingenhouzia harknessii Rose, U. S. Dept. Agr. Bur. Pl. Ind. Bull. **131**: 54. 1908.

Baja California; type from Santa Margarita Island.

Shrub, 0.5 to 2 meters high, forming dense rounded clumps; leaves reniform or broadly cordate, 1.5 to 5 cm. long, acute, deeply cordate at base, shallowly trilobate, glabrous except when very young; bractlets broadly ovate, acuminate; petals 2.5 to 3 cm. long, sulphur-yellow, with purple claws; fruit 3-celled, the cells 4-seeded.

4. **Gossypium barbadense** L. Sp. Pl. 693. 1753.

Cultivated and sometimes growing wild; specimens seen from Veracruz, Jalisco, Sinaloa, and Baja California. Widely cultivated in warm regions.

Plants herbaceous or often becoming fruticose; leaves 7 to 13 cm. long, cordate at base, 3 or 5-lobed, the lobes acute or acuminate, ascending or spreading, glabrous or nearly so; bractlets free; petals pale yellow, tinged with purple, about 5.5 cm. long; seeds covered with long white cotton.

This species includes most of the cultivated forms of sea-island and other long-staple cottons.

5. **Gossypium lanceolatum** Tod. Rel. Cult. Cot. 185. *pl. 5, f. 1.* 1877–78.

Described from wild Mexican plants.

Leaves lanceolate, acuminate, pinnate-nerved; bracelets large, ovate, deeply cordate, deeply toothed above, exceeding the corolla.

The plant is known only from the data afforded by the original description.

6. **Gossypium palmerii** Watt, Wild & Cult. Cotton 204. *pl. 34.* 1907.

Known only from the type locality, Acapulco, Guerrero.

Shrub with dark red branches; leaves mostly trilobate but partly entire, the lobes narrowly oblong, long-acuminate, glabrous or nearly so; pedicels with 3 large glands at apex; bractlets with glands within at base; petals pale yellow; seeds covered with green fuzz and long white cotton.

Gossypium fruticulosum Tod.[2] may be a form of the same species. It was described from Mexico.

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[1] DC. Prodr. 1: 474. 1824.

[2] Rel. Cult. Cot. 187. *pl. 12, f. 3.* 1877–78.

7. **Gossypium schottii** Watt, Wild & Cult. Cotton 206. *pl. 35.* 1907.

Yucatán; type from Mérida. Reported from Paraguay.

Leaves usually 3 or 5-lobed, the lobes mostly oblong or narrowly oblong, long-acuminate, glabrous or nearly so, spreading; bractlets free; petals yellow, tinged with purple. "Xchup" (Yucatán, Maya).

8. **Gossypium microcarpum** Tod. Hort. Panorm. 1: 63. *pl. 14.* 1876.

Described from plants believed to be of Mexican origin. The species has been found in cultivation in Peru, Brazil, Africa, and the Philippines.

Lobes of the leaves ovate, acute; bractlets large, glabrous, deeply cordate; petals pale yellow, without purple spots; seeds with greenish or brownish fuzz and dirty-white coarse cotton.

9. **Gossypium mexicanum** Tod. Rel. Cult. Cot. 193. *pl. 6.* 1877–78.

Cultivated in Mexico and probably growing also without cultivation. Widely cultivated in other regions.

Plants shrubby; petioles and pedicels usually pilose at first; leaves 7 to 15 cm. wide, the lobes broadly ovate; petals pale yellow or white, flushed with pink, scarcely exceeding the bractlets; seeds with ashy fuzz and dull white to reddish cotton. "Ichcaxihuitl" (Nahuatl; "wool-plant").

The plant is treated by Hernández[1] in a chapter entitled "De *Ychcaxihuitl* seu Gossypio."

10. **Gossypium hirsutum** L. Sp. Pl. ed. 2. 975. 1763.

Cultivated in Mexico and growing without cultivation in many localities. Cultivated in many parts of the earth.

Plants herbaceous or often woody, with reddish stems, the branches and leaves sparsely or densely hirsute; petals yellow or pale yellow, often purplish at base; capsule usually 4-celled.

19. THURBERIA A. Gray, Mem. Amer. Acad. n. ser. 5: 308. 1854.

1. **Thurberia thespesioides** A. Gray, Mem. Amer. Acad. n. ser. 5: 308. 1854.

Gossypium thurberi Tod. Prodr. Gossyp. 7. 1878.

Chihuahua, Sonora, and Jalisco; type collected near Cocospera and Ymurís, Sonora. Southern Arizona.

Plants herbaceous or fruticose, 1 to 3 meters high, glabrous or nearly so; leaves long-petiolate, the blades mostly 3-parted or deeply 3-lobate, the divisions lanceolate, entire, long-acuminate, gland-dotted; flowers axillary or subcorymbose; bractlets 3, longer than the truncate calyx; petals about 2.5 cm. long, white, turning purplish, black-dotted; capsule 3-celled, 12 to 20 mm. long; seeds woolly. "Algodoncillo" (Sonora).

This plant has been referred erroneously by some authors to *Ingenhouzia triloba* DC..

20. ERIOXYLUM Rose & Standl. Contr. U. S. Nat. Herb. 13: 307. 1911.

Shrubs or trees; leaves long-petiolate, entire; flowers chiefly axillary, usually appearing before the leaves; bractlets 3, much shorter than the calyx; petals purple; capsule 3-celled, ovoid, covered with large black glands; seeds woolly.

Calyx with 5 triangular acuminate lobes; pedicels 10 to 15 mm. long. 1. **E. palmeri.**

Calyx obscurely repand-dentate; pedicels 2 to 5 mm. long 2. **E. aridum.**

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[1] Thesaurus 308. 1651.

1. **Erioxylum palmeri** Rose, Contr. U. S. Nat. Herb. **13**: 308. 1911.
Cienfugosia palmeri Rose, Contr. U. S. Nat. Herb. **1**: 308. 1895.
Known only from Colima, the type locality.
Shrub, 1.5 to 2.5 meters high; leaves broadly ovate, 5 to 12 cm. long, long-acuminate, subcordate at base, sparsely and minutely stellate-pubescent; petals 6 cm. long, minutely pubescent outside; capsule 2 to 2.5 cm. long.

2. **Erioxylum aridum** Rose & Standl. Contr. U. S. Nat. Herb. **13**: 307. 1911.
Sinaloa, in coastal thickets; type from Culiacán.
Slender shrub or tree, 3 to 6 meters high; bark gray; leaves broadly ovate, 1.5 to 3 cm. long, acute or obtuse, rounded at base, sparsely and minutely stellate-pubescent; petals about 5 cm. long, nearly black within below the middle; capsule 2.5 cm. long. "Amapola."
The wood is sometimes used for fencing. The trunk is often 30 to 35 cm. in diameter.

96. BOMBACACEAE. Cotton-tree Family.

Trees; leaves simple or digitately compound, deciduous; pubescence chiefly of stellate hairs; flowers small or large, often bracteolate; calyx 5-lobate or truncate or opening irregularly; petals 5; stamens 5 to many, the filaments free or united into a tube; fruit dry or fleshy, 2 to 5-celled, dehiscent or indehiscent; seeds 2 to many in each cell.

Leaves simple.
Stamen tube short ..... 1. **HAMPEA.**
Stamen tube elongate ..... 2. **QUARARIBEA.**
Leaves digitately compound.
Seeds winged; flowers in one-sided racemes ..... 3. **BERNOULLIA.**
Seeds not winged; flowers mostly solitary.
Stamen tube dividing into 5 parts, each of these bearing several sessile anthers at the summit; trunk often spiny; leaflets often serrate. 4. **CEIBA.**
Stamen tube dividing into many fascicles or filaments, the anthers borne on long filaments; trunk unarmed; leaflets entire.
Seeds 1.5 cm. or more in diameter; flowers usually 20 cm. long or larger; stamen tube elongate, the fascicles repeatedly branched. 5. **PACHIRA.**
Seeds 6 mm. or less in diameter; flowers usually less than 15 cm. long; stamen tube short, the fascicles dividing into simple filaments. 6. **BOMBAX.**

1. HAMPEA Schlecht. Linnaea 11: 371. 1837.

Trees or shrubs; leaves long-petiolate, entire or shallowly trilobate; flowers on axillary pedicels, usually fasciculate; bractlets 3 or more, very small; calyx truncate or obscurely 5-lobate; capsule 3-celled, the cells few-seeded; funicle dilated into a large fleshy aril.

Capsule densely villous within; calyx truncate ..... 1. **H. integerrima.**
Capsule glabrous within or hairy only along the sutures.
Capsule 1.5 cm. long, the cells about 3-seeded ..... 2. **H. trilobata.**
Capsule 3 cm. long, the cells many-seeded ..... 3. **H. tomentosa.**

1. **Hampea integerrima** Schlecht. Linnaea **11**: 372. 1837.
Veracruz; reported from Tabasco; type from Josocola, Veracruz. Central America.
Small tree; leaves ovate to rounded-ovate, 10 to 22 cm. long, acute or acuminate, rounded or subcordate at base, entire, glabrous in age or nearly so:

flowers long-pedicellate; calyx and corolla minutely stellate-tomentulose outside; bractlets 3, caducous; petals nearly 2 cm. long, whitish; capsule about 1.5 cm. long. "Jonote blanco" (Veracruz, *Seler*); "majagua" (Tabasco, *Rovirosa*).

2. Hampea trilobata Standl., sp. nov.

Yucatán and Campeche; type from Apazote, Campeche (*Goldman* 488; U. S. Nat. Herb. no. 396850).

Leaves 8 to 13 cm. long, 7 to 9.5 cm. wide, rounded or subcordate at base, with 3 very short, triangular, acute or obtuse lobes near the apex, glabrate above, minutely stellate-pubescent beneath; calyx 5 mm. long, stellate-tomentulose, the lobes ovate-oval, obtuse, nearly as long as the tube; bractlets 3; capsule finely tomentose outside, glabrous within except along the sutures.

The type specimen consists of a fruiting branch. A flowering specimen from Izamal, Yucatán (*Gaumer* 845) is probably conspecific, but it has more copious and looser pubescence. The petals are about 13 mm. long.

3. Hampea tomentosa (Presl) Standl.

Thespesia tomentosa Presl, Rel. Haenk. 2: 136. 1836.

Oaxaca; type from western Mexico.

Leaves ovate to rounded-ovate, 8 to 20 cm. long, acute or acuminate, sometimes shallowly trilobate, stellate-pubescent on both surfaces, densely so beneath, in age sometimes glabrate; calyx lobes oval-ovate, obtuse, shorter than the tube, the calyx with 3 large dark glands at base; bractlets 3 to 6, caducous; petals white (?), about 1.5 cm. long.

Specimens collected recently in Oaxaca by Conzatti and by Reko agree well with Presl's description of *Thespesia tomentosa*, but they appear referable rather to *Hampea*. Presl's species was based upon flowering specimens.

2. QUARARIBEA Aubl. Pl. Guian. 691. 1775.

Trees or shrubs; leaves entire or nearly so, pinnate-nerved; peduncles 1-flowered, solitary opposite the leaves; calyx tubular-obconic, 3 to 5-dentate; petals narrow, white; stamen column elongate, antheriferous at the apex; fruit 2-celled, hard, indehiscent, sometimes by abortion 1-celled.

The dried plants have the odor of slippery elm (*Ulmus fulva* Michx.).

Leaves conspicuously barbate beneath in the axils of the veins ---- 1. Q. funebris.
Leaves not barbate beneath ---------- 2. Q. fieldii.

1. Quararibea funebris (Llave) Standl.

Lexarza[1] *funebris* Llave; Llave & Lex. Nov. Veg. Descr. 2: 12. 1825.

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[1] Juan José Martínez de Lexarza was born at Valladolid (now Morelia) in 1785. At the age of 12 he became a student in the Colegio de Minería in the City of Mexico and later graduated with great distinction, his synodic being no less a person than Humboldt. He was unable to continue his mineralogical studies, and returned to Michoacán, where he became a member of the provincial militia and rose to the rank of first captain. He made the acquaintance of La Llave, who was established at the Cathedral of Morelia, and that distinguished naturalist interested him in botany. In 1824–25 they published jointly descriptions of a number of new genera of Mexican plants and various species of orchids. Lexarza became an enthusiastic student of orchids, and devised a special classification for them, based upon seed and pollen characters. He explored various regions of Mexico, and promised to become one of the accomplished botanists of his day, but his great industry proved his undoing and he died in 1824.

Myrodia funebris Benth. Journ. Linn. Soc. Bot. 6: 115. 1862.

Reported from Oaxaca and Veracruz; originally described from Izúcar, Puebla. Guatemala and El Salvador.

Tree, often 20 meters high, with broad dense crown; leaves oval or elliptic, short-petiolate, 13 to 40 cm. long, obtuse to acuminate, rounded at base, glabrous except for the tufts of hairs in the axils of the veins beneath; flowers short-pedicellate; calyx bracteolate, tomentulose; petals pure white, linear-oblong, the slender claws as long as the calyx; stamen tube twice as long as the calyx; fruit subglobose. "Cacahuaxochitl," "cacaoxochitl," "flor de cacao," "madre de cacao," "rosa de cacao."

In connection with the original description of the genus *Lexarza*, La Llave[1] gives the following account of the tree: "The President of the Republic, Guadalupe Victoria, while on a military expedition to the southern region, between Oaxaca and Angelopolis, passing through Izúcar and admiring the funereal majesty of *Lexarza*, had sent to me a branch with flowers and fruit, that a description might be drawn of it; afterward my colleague, Doctor José Ignacio Luna, sent a drawing of the tree, with accurate measurements, adding the information that to the splendid shelter formed by the lower branches of the tree, the primitive inhabitants were wont to come to mourn their dead. He stated also that flowers were added to the *pozonque* (a cold drink made of cacao) which they use at weddings and festivals, to give flavor to it, for which reason, perhaps, the tree is given the vernacular name of *cacahoaxochitl*, which may be rendered into Spanish as *flor de cacao*. According to the same authority, no other tree of the same sort is found at Izúcar or elsewhere in the region, but Doctor Miguel Valentín, of Huamantla, no mean student of natural history, after reading the description of the tree, assured me that when he was making a journey through the Mixteca he observed trees similar to this."

In Costa Rica the young shoots of some species (known as "garrocho" and "molenillo"), which develop their branches, like cacao, in whorls of 5, are used to make "molenillos," the utensils with which chocolate is beaten to a froth.

2. **Quararibea fieldii** Millsp. Field Mus. Bot. 1: 309. 1898.

Yucatán; type from Hacienda de Chabenché.

Leaves oblong-obovate, 15 to 30 cm. long, acute, obtuse or broadly cuneate at base, glabrous; flowers subsessile; calyx 2.5 cm. long, tomentulose; petals

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[1] Don Pablo de La Llave was born in the city of Córdoba, Mexico, in 1773. He was educated in the Colegio de San Juan de Letran, in that city, and later gave courses in philosophy in the same institution. He pursued ecclesiastical studies and received the degree of doctor of theology when he was scarcely 19 years of age. In 1801 he went to Spain to continue his studies, this course being necssary during the Spanish domination, since at that time the offices of the church were given only to those who had been born in Spain or educated there. He became deeply interested in natural history, especially botany, and was finally appointed director of the botanical garden at Madrid. He took an interest in political affairs, also, and in 1812 was elected a deputy of the Cortés. In 1823 he returned to Mexico, and was appointed Minister of Justice and Ecclesiastical Affairs, a position which he filled until 1825. In 1830 he was president of the Senate chamber. La Llave died in 1833. He published numerous biographical and patriotic papers and treatises upon natural science. He was associate author, with Lexarza, of the Novorum Vegetabilium Descriptiones, published in 1824-25. He described several new genera of plants, most of which were dedicated to the heroes of the Mexican war of independence.

nearly twice as long as the calyx, 6 to 8 mm. wide; fruit ovoid, 3 cm. long, tomentose. "Maha."

The flowers are employed to flavor chocolate.

DOUBTFUL SPECIES.

MYRODIA VERTICILLARIS DC. Prodr. 1: 447. 1824. Described from Mexico, the description based upon a plate by Sessé and Mociño.[1] The illustration suggests *Quararibea turbinata* (Swartz) Poir., a species of South America and the West Indies, which has been reported from Mexico.

3. BERNOULLIA[2] Oliver in Hook. Icon. Pl. 12: 62. 1873.

1. **Bernoullia flammea** Oliver in Hook. Icon. Pl. 12: 62. *pl. 1169, 1170.* 1873.

Oaxaca. Type from "Costa Grande," Guatemala.

Tree, sometimes 40 meters high, with broad crown; leaflets usually 5 or 6, oblong-oblanceolate, petiolulate, 10 to 22 cm. long, acute or acuminate, glabrous; whole inflorescence bright red, obscurely puberulent; calyx 1 cm. long, shallowly bilobate; petals recurved; stamen tube long-exserted, the anthers clustered at the apex; fruit brown, ellipsoid, 20 cm. long, glabrous within; seeds (including the long wing) about 5 cm. long. "Palo calabaza," "palo de perdiz" (Oaxaca).

The wood is described as soft and spongy.

4. CEIBA Medic. Malvenfam. 15. 1787.

Trees, often very large, the trunk and branches often armed with spines; leaves digitate, the leaflets 5 to 7, usually serrate; peduncles axillary, 1-flowered, the flowers large or small; calyx truncate or 5-lobate; petals oblong or linear-oblong, hairy outside; stamen tube short, dividing into 5 long branches, each of these bearing a few crowded anthers at the apex; capsule woody, 5-celled, densely lanate within, the seeds small.

The species of *Ceiba* (of which *Eriodendron* is a synonym), *Pachira*, and *Bombax* have been much confused in Mexican literature and in botanical publications in general. The following Mexican names are reported for plants whose identity is doubtful, although they belong to one of these three genera: "Escobetilla," "pitón" (Morelos); "thura" (Michoacán, Tarascan); "kuyché" (Yucatán, Maya); "tumbile" (Michoacán); "yaga-xeni" (Oaxaca, Zapotec).

The trees of this group are well known in Mexico as well as elsewhere in tropical America, particularly because of their large size, broad crowns, and extensive buttresses. One of the earliest references to the ceiba trees in Mexican literature is by Bernal Díaz del Castillo who, in his True History of the Conquest of Mexico, relates how, in 1519, in the Indian town of Tabasco on the Río de Grijalva, after having defeated the natives in battle, Cortés took possession of the country in the King's name by drawing his sword and making three cuts in a great ceiba tree which stood in the central plaza of the town. Later Díaz states that on Palm Sunday "a cross was made in a large ceiba tree on the spot where the battle was fought, in order to afford a long memorial thereof, for this tree has the quality of preserving scars on its bark."

Oviedo (Lib. IX, Cap. XI) gives an interesting account of the ceiba or cotton trees, as follows: "In the chapters in which I treated of the oak and mahogany I spoke of their size, and on the mainland there are many such

[1] DC. Calq. Dess. Fl. Mex. *pl. 99.*

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[2] Named for G. Bernoulli, a native of Switzerland, who resided for some time in Guatemala, where he made botanical collections.

trees and others still larger. If I should speak of these things without having seen them I should be afraid to mention them; for it is the custom of fault-finders not to content themselves with repudiating those things which in themselves are doubtful, but to contradict things that are publicly known. But since I know that I speak the truth, it does not bother me if the ignorant revile me, for barking dogs do not bite. I may say then that at a league's distance from the city of Darién, otherwise known as Santa María del Antigua, runs a very wide and deep river called Cutí. Before the Christians took possession of that country, the Indians had thrown down a stout tree which crossed that river from bank to bank; it was in a place where we were constantly crossing to go to our mines and plantations. The tree was very long and thick, but it had been there for some time and had sunk in the middle. Although we passed along the upper side, there was one stretch where the water came to the knees, and every year it lowered a little more, because the stream wore away the banks on which the trunk rested. Wherefore in the year 1522, when I was magistrate and captain in that city, I had another tree growing on the bank thrown across the stream a few paces below. When cut down it stretched clear across the river, and 50 feet besides; and the river was more than 100 feet wide. This tree where it was thickest was 16 palms or more in diameter. * * * In comparison with many other trees in the region, this was a small one." * * * "In Hispaniola there was a tree, eight leagues from this city, where it had the name of the *árbol gordo*, of which I have often heard the Admiral Don Diego Colón speak, and I have heard him say that he and fourteen other men, taking hold of hands, could not reach around it. * * * To me this is not remarkable, remembering still larger *ceyba* trees that I have seen on the mainland. In the province of Nicaragua are the largest trees I have yet seen, which greatly surpass those I have mentioned; I shall speak only of a *ceyba* which I saw many times, less than half a league from the residence of the Cacique of Thecoatega, beside a river of the town of the Cacique of Guaçama, which belongs to the grant of a man called Miguel Lucas, or his companions Francisco Núñez and Luis Farfán. This tree I measured with my own hands by a *cabuya* cord, and found its circumference at the base to be 33 varas, or 132 spans [88 feet]; and since it stood on the bank of a river it was not possible to measure the lowest portion of the roots; if properly measured, I judge its circumference would have been 36 varas or 144 spans [96 feet]. This had the thickest trunk of all the trees I have seen. The wood of the *ceyba* trees is spongy, easily cut, and light, and the tree is unimportant except for two things: One is its wool and the other its vast shade, for the branches are very wide-spreading, and the shade is wholesome, not oppressive like that of other trees of the Indies, which is notoriously harmful. * * * The wool is short and I do not believe it could be spun; but for pillows and cushions it is unique in its softness, and no feathers, wool, or cotton equal it; but if wet it forms into balls and is spoiled. * * * The Indians of Nicaragua have places set aside for the *tiangüez* or market, and there they have two, three, or four of these *ceyba* trees for shade, which are sufficient to shelter one to two thousand people. * * * In the province of Nicaragua this tree is called *poxot*, and in other places it has other names."

Flowers 3 to 3.5 cm. long. Leaflets glabrous, even when young.
1. C. pentandra.

Flowers 8 to 15 cm. long or larger.
Leaflets 1.5 to 3.5 cm. long, usually rounded or very obtuse at apex and mucronate----------**2. C. parvifolia.**

Leaflets usually much larger, mostly acuminate.
Mature leaflets copiously stellate-tomentose beneath; young branches mostly unarmed.....3. C. acuminata.
Mature leaflets glabrous beneath or nearly so, the pubescence, if any, chiefly of simple hairs; young branches usually very prickly. 4. C. aesculifolia.

1. Ceiba pentandra (L.) Gaertn. Fruct. & Sem. **2**: 244. 1791.
Bombax pentandrum L. Sp. Pl. 511. 1753.
Ceiba casearia Medic. Malvenfam. 16. 1787.
Eriodendron anfractuosum DC. Prodr. **1**: 479. 1824.
Eriodendron occidentale Don, Hist. Dichl. Pl. **1**: 513. 1831.

Sonora (cultivated), Tepic, Guerrero, Yucatán, Veracruz, and Tamaulipas. Widely distributed in tropical America, Asia, and Africa.

Large tree, sometimes 40 meters high, with spreading crown; trunk often with large buttresses at base, the bark gray or green, smooth but covered with large conical spines; leaflets 5 to 7, oblanceolate, oblong, or obovate-oblong, 8 to 20 cm. long, acuminate; calyx 1 to 1.5 cm. long; flowers white or pink; petals silky-hairy outside; fruit elliptic-oblong, 10 to 12 cm. long, the brown seeds imbedded in the silky "cotton." "Ceiba," "ceibo" (Yucatán, Oaxaca, Veracruz, Tamaulipas, Guerrero, Guatemala, Costa Rica, Cuba); "yaxché," "piim," "peem" (Yucatán, Maya); "pochote" (Jalisco, Veracruz); "árbol de algodón" (Veracruz, Morelos); "pochote," "pochotl," "pochotle" (Veracruz, Campeche, etc.); "cabellos de ángel," "pitón," "xiloxochitl" (*Herrera*); "ceibón" (Nicaragua).

The usual English name is "silk-cotton tree." The tree grows very rapidly. The wood is white and soft, with a specific gravity of about 0.520. The trunks are often used for canoes, because the wood is so easily worked, and the wood is employed also for making packing boxes and matches. The most important product of the tree is the silky fiber enveloping the seeds, which is very fine, light, and elastic, and does not become matted under pressure. Large quantities of it are exported from the East Indies and West Africa under the names "kapok," "kapoc," and "kapok fiber." It is employed for stuffing mattresses, pillows, life preservers, and other articles. The silk is employed locally in Mexico and is exported in small quantities. It is said to be worth about $1.50 (silver) per kilogram. The silk has been used in England for making beaver hats.

The seeds yield an oil used for illumination and for the manufacture of soap. The buttresses at the base of the trunk are often very wide and so thin that they are sawed into large pieces to be used as doors for native houses. The leaves are reported to be cooked and eaten at times. The large flowers are eaten by stock as they fall to the ground. The bark is applied to wounds, and taken internally it is reputed to have emetic, diuretic, and antispasmodic properties.

For illustrations of *C. pentandra* see Contr. U. S. Nat. Herb. **8**: *pl. 24*; **9**: *pl. 42*.

2. Ceiba parvifolia Rose, Contr U. S. Nat. Herb. **8**: 320. 1905.

Guerrero to Morelos, Puebla, and Oaxaca; type from Matamoros, Puebla.

Small or medium-sized tree, the young branches usually armed with stout prickles; leaflets 5 or 6, obovate-elliptic or rounded-obovate, often long-petiolulate, stellate-tomentose or in age glabrate; calyx 1.5 to 2.5 cm. long; petals about 13 cm. long, covered outside with yellow hairs; fruit oblong-ellipsoid, 8 cm. long.

3. **Ceiba acuminata** (S. Wats.) Rose, Contr. U. S. Nat. Herb. **8**: 320. 1905.
Eriodendron acuminatum S. Wats. Proc. Amer. Acad. **21**: 418. 1886.
Eriodendron tomentosum Robinson, Proc. Amer. Acad. **29**: 314. 1894.
Ceiba tomentosa Britt. & Baker, Journ. Bot. Brit. & For. **34**: 175. 1896.

Baja California and Sonora to Chihuahua, Tamaulipas, and Zacatecas, and probably southward to Oaxaca and Chiapas; type from Hacienda San Miguel, Chihuahua.

Large or medium-sized tree, the greenish trunk covered with large conic spines; leaflets usually 7, lance-elliptic or oblanceolate, 7 to 15 cm. long, cuspidate-acuminate, thin, sharply serrate; calyx 3 to 4 cm. long, tomentose or glabrous; petals 10 to 14 cm. long, densely covered outside with yellow hairs; fruit very thick and hard, 15 to 18 cm. long, the "cotton" brownish or nearly white. "Ceiba" (Tamaulipas); "pochote" (Sinaloa, Chihuahua).

A flowering specimen from Chiapas, which probably belongs here, is accompanied by the vernacular name "mosmote." The cotton is used for stuffing pillows and for candlewicks. Hartman reports that the fleshy roots are eaten.

Eriodendron tomentosum is a form with tomentose calyx, but this character appears to be variable and to be merely a matter of degree.

4. **Ceiba aesculifolia** (H. B. K.) Britt. & Baker, Journ. Bot. Brit. & For. **34**: 175. 1896.
Bombax aesculifolium H. B. K. Nov. Gen. & Sp. **5**: 298. 1821.
Eriodendron aesculifolium DC. Prodr. **1**: 479. 1824.
Ceiba grandiflora Rose, Contr. U. S. Nat. Herb. **1**: 308. 1895.
Ceiba schottii Britt. & Baker, Journ. Bot. Brit. & For. **34**: 173. 1896.
Ceiba pallida Rose, Contr. U. S. Nat. Herb. **8**: 320. 1905.

Sinaloa and Jalisco to Oaxaca, Yucatán, and Querétaro; type from Campeche. Guatemala.

Large or medium-sized tree, the trunk armed with stout conic spines; leaflets 5 to 7, elliptic, obovate, or oblanceolate, 5 to 15 cm. long, acuminate or cuspidate-acuminate, serrate or rarely entire, usually glaucescent beneath; calyx 2 to 4 cm. long, glabrous, often glaucous; petals 10 to 16 cm. long, yellow-hairy outside; fruit ellipsoid-oblong, 12 to 18 cm. long, the "cotton" brownish or white. "Pochote" (Oaxaca, Yucatán, Morelos, Colima, Guerrero, Sinaloa); "pochotl" (Nahuatl); "piim," "yaxché" (Yucatán, Maya); "ceiba," "ceibo" (Morelos, Yucatán, Guatemala, etc., a name probably of Carib origin).

The flowers are white at first but turn brown in age. The species is slightly variable, but none of the forms appear worthy of specific rank; indeed, it is rather doubtful whether *C. acuminata* is really a distinct species.

5. PACHIRA Aubl. Pl. Guian. 725. 1775.

Large trees; leaves digitate, the leaflets 3 to 9, entire; peduncles axillary, 1-flowered; calyx truncate; petals linear or linear-oblong, more than 15 cm. long; stamen tube 4.5 to 10 cm. long, the fascicles of stamens repeatedly branched; fruit large and woody, 5-valvate, naked within; seeds 1.5 cm. or more in diameter.

Petals 18 to 19 cm. long; stamen tube 4.5 cm. long_____**1. P. macrocarpa.**
Petals 23 to 30 cm. long; stamen tube 6 to 10 cm. long_____**2. P. aquatica.**

1. **Pachira macrocarpa** (Schlecht. & Cham.) Walp. Repert. Bot. **1**: 329. 1842.
Carolinea macrocarpa Schlecht. & Cham. Linnaea **6**: 423. 1831.
Pachira longifolia Hook. in Curtis's Bot. Mag. **76**: *pl. 4549*. 1850.

Veracruz and Oaxaca; reported from Tabasco; type from Papantla and Tecolutla, Veracruz. Central America.

Large tree with rounded crown; leaflets 6 to 8, elliptic-oblong or obovate-oblong, 8 to 10 cm. long, obtuse or acutish, coriaceous, glabrous; calyx 1.5 cm. long, minutely tomentulose; petals 7 to 11 mm. wide, minutely tomentulose outside; stamens purplish; fruit subglobose. "Apompo," "zapote reventador" (Veracruz); "sapotón" or "zapotón" (Guatemala, El Salvador); "pumpumjuche" (El Salvador).

The fruit is said to be as large as a coconut. The tree usually grows along river banks. The seeds fall into the water, where they germinate and float about with expanded cotyledons until they reach the bank and take root. The leaves and flowers are said to be employed to relieve inflammation of the eyes, and the seeds to be employed as a substitute for cacao.

Pachira longifolia appears to be intended as a new name for *P. macrocarpa*, but the plant illustrated is probably *P. aquatica*. For illustrations of *P. macrocarpa* see Contr. U. S. Nat. Herb. **18**: *pl. 68, 69.*

2. **Pachira aquatica** Aubl. Pl. Guian. 725. *pl. 291, 292.* 1775.

Carolinea princeps L. f. Suppl. Pl. 314. 1781.

Veracruz and probably elsewhere; reported from Tabasco and Chiapas, Central and South America; type from French Guiana.

Large or small tree; leaflets 5 to 7, oblong, elliptic, or oblanceolate, 8 to 20 cm. long, acute to rounded at apex, coriaceous, glabrous or nearly so; calyx 1.5 to 2 cm. long; petals 10 to 15 mm. wide, greenish and tomentulose outside, yellowish within; fruit ovoid, 10 to 30 cm. long. "Zapote bobo" (Tabasco, *Ramírez*); "zapote de agua" (Chiapas, *Rovirosa*); "ceibón de agua," "ceibón de arroyo," "castaño silvestre" (Cuba).

The tree is said to be known in British Honduras as "provision-tree." The large seeds are often eaten, usually after having been roasted, and it is said that in the Guianas the young leaves are sometimes cooked and eaten.

Here is to be referred Hemsley's report of *P. insignis* Savigny, a Brazilian plant. Hemsley also reports *P. minor* (Sims) Hemsl. from Mexico, but the original illustration[1] of that species is unlike any Mexican plant of which the writer has seen specimens. For illustrations of *P. aquatica* see Contr. U. S. Nat. Herb. **18**: *pl. 70, 71.*

DOUBTFUL SPECIES.

PACHIRA AUREA Decaisne, Fl. Serr. Jard. **23**: 47. 1880. Type from Xochicalco.

6. BOMBAX L. Sp. Pl. 511. 1753.

Large trees, unarmed; leaflets usually 5, entire; peduncles axillary, solitary or fasciculate, 1-flowered; calyx truncate; petals oblong-linear, usually less than 15 cm. long; stamen tube very short, the filaments simple and all rising directly from it; fruit a 5-celled woody capsule, densely lanate within; seeds small, buried in the wool or "cotton."

Leaves glabrous beneath or nearly so, at least in age ..... 1. B. ellipticum.
Leaves tomentose beneath, even in age ..... 2. B. palmeri.

1. **Bombax ellipticum** H. B. K. Nov. Gen. & Sp. 5: 299. 1821.

Carolinea fastuosa DC Prodr. **1**: 478. 1824.

Bombax mexicanum Hemsl. Diag. Pl. Mex. 4. 1878.

Jalisco to San Luis Potosí, Veracruz, Yucatán, and Oaxaca; type from Chilpancingo, Guerrero. Guatemala.

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[1] Sims in Curtis's Bot. Mag. **34**: *pl. 1412.* 1811.

Large unarmed tree with smooth, green or gray bark; leaflets petiolulate, elliptic, oval, or obovate-elliptic, 10 to 24 cm. long, usually broadly rounded at apex, thinly tomentose when young but in age nearly glabrous, thin; calyx about 1.5 cm. long, commonly with 10 glands at base; petals 7 to 13 cm. long, purplish; stamens pink or white; fruit oblong or ellipsoid, 10 cm. long, the "cotton" dirty white. "Amapola," "amapola blanca," "amapola colorada" (Yucatán); "xcunché" (Yucatán, Maya); "xiloxochitl" (Nahuatl, "corn-silk flower," from the resemblance of the stamens to corn silk); "ceiba" (Veracruz, Guerrero); "chilochuchi," "chicochuchi" (corruptions of the Nahuatl name); "itztamatl," "titilamatl" (Guerrero, Veracruz, *Ramírez*); "pochote," "pochotl" (Mexico); "xanacol," "xihuicxan" (Veracruz); "yaco de la costa," "cabellos de ángel," "coquito," "disciplina," "jiquique," "lele," "pongolote," "tiata" (Oaxaca, *Reko*); "clavellina" (Guerrero); "doncella" (Guatemala); "chicochuchi" (*Conzatti*).

The tree blooms when leafless. The handsome flowers are often gathered for decorations in churches and for similar purposes, and they were esteemed by the Mexicans as one of their most beautiful flowers. The decoction of the bark and root is used as a remedy for toothache and to harden the gums.

This is probably the tree illustrated by Hernández[1] and described in a chapter entitled "De Xiloxochitl, Flore Capillaceo." He states that the bark was highly valued as a remedy for ulcers, and for its diuretic properties.

Bombax ellipticum has been reported from Yucatán as *Pachira fastuosa* Decaisne and *P. alba* (Lodd.) Walp., and Mexican reports of *Bombax ceiba* L., an Old World species, are probably referable here. Hemsley gives no reasons for his segregation of *B. mexicanum*. The numerous specimens seen by the writer exhibit some variation, especially in the size of the flowers, but all (including some from the type locality of *B. mexicanum*) appear to be conspecific.

2. **Bombax palmeri** S. Wats. Proc. Amer. Acad. **22**: 399. 1887.

Sonora to Jalisco; type from the barranca near Guadalajara, Jalisco.

Tree, 8 to 10 meters high or larger, the trunk 60 to 70 cm. in diameter, covered with smooth green bark; leaflets nearly sessile, obovate to nearly orbicular, mostly 10 to 25 cm. long, rounded to acute at apex but usually apiculate, tomentose on both surfaces when young but glabrate above in age; petals 10 to 17 cm. long, whitish-tomentulose outside; stamens pink or purplish; fruit oblong or ellipsoid, 10 to 12 cm. long, the "cotton" brownish. "Cuajilote," "guajilote," "clavellina" (Sinaloa); "clavellina de la barranca" (Jalisco).

The tree flowers when leafless. The burned and powdered bark is applied to wounds.

EXCLUDED GENUS.

MONTEZUMA DC. Prodr. **1**: 477. 1824. The single species, *M. speciosissima* DC., was based upon one of Sessé and Mociño's drawings. No similar plant has been found among recent Mexican collections, and it appears that *Montezuma* is the Porto Rican plant, *Thespesia grandiflora* DC., which was made the type of a new genus, *Maga*, by Urban.[2]

97. STERCULIACEAE. Cacao Family.

Trees, shrubs, or herbs, sometimes scandent, the pubescence chiefly stellate; leaves alternate, simple or rarely compound, stipulate; flowers small or large, chiefly in cymes, usually perfect, regular or sometimes zygomorphic; calyx

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[1] Thesaurus 68. 1651.

[2] Symb. Antill. **7**: 281. 1912.

gamosepalous, usually 5-parted; petals 5 or none, free or united with the stamen tube; stamens connate, at least at base, the tube usually with 5 staminodia, the anthers borne in the sinuses; fruit dry or rarely baccate, usually 5-celled, variously dehiscent.

The genus *Brotera* Cav. was originally described from Mexico, but incorrectly, or else it was based upon a cultivated plant. The name is considered a synonym of *Melhania* Forsk. and the species described by Cavanilles is an African one.

Flowers unisexual; fruit of distinct carpels; leaves simple and deeply lobed or often compound ---------- 1. **STERCULIA.**
Flowers perfect; fruit not of distinct carpels; leaves simple, rarely lobed.
  Petals none. Leaves lobed.
    Flowers zygomorphic; anthers sessile ---------- 2. **CHIRANTHODENDRON.**
    Flowers regular; anthers on long filaments ---------- 3. **FREMONTODENDRON.**
  Petals present.
    Androgynophore very long, in age equaling or longer than the fruit; carpels often spirally twisted ---------- 4. **HELICTERES.**
    Androgynophore short, always shorter than the fruit; carpels never twisted.
      Petals flat; anthers 5.
        Seeds numerous in each cell ---------- 5. **HERMANNIA.**
        Seeds 2 in each cell or, by abortion, only 1.
          Capsule 1-celled ---------- 6. **WALTHERIA.**
          Capsule 5-celled.
            Staminodia present; calyx in fruit 1.5 to 4 cm. long.
            Staminodia none; calyx in fruit 1 cm. long or less. 8. **MELOCHIA.**
      Petals concave or cucullate; anthers 5 to 15.
        Anthers 2 or more in each sinus of the stamen tube.
          Blade of the petal entire; fruit not muricate ---------- 9. **THEOBROMA.**
          Blade of the petal deeply bifid; fruit muricate ---------- 10. **GUAZUMA.**
        Anthers 1 in each sinus.
          Petals free from the stamen tube ---------- 11. **NEPHROPETALUM.**
          Petals united at the apex with the stamen tube.
            Petals naked on the back or furnished with a gland; plants unarmed, never scandent ---------- 12. **AYENIA.**
            Petals produced dorsally into a ligulate blade; plants often prickly and scandent ---------- 13. **BUETTNERIA.**

1. STERCULIA L. Sp. Pl. 1007. 1753.

Trees; leaves simple and lobate or digitately compound; flowers unisexual or polygamous, paniculate, usually axillary; calyx 5-lobate, commonly colored and corolla-like; petals none; stamen column with usually 15 anthers at the apex; fruit 5-carpellate, the carpels distinct, spreading, woody, dehiscent along the inner side; seeds 1 to many in each carpel, large.

Leaves simple, palmately lobed ---------- 1. **S. apetala.**
Leaves digitately compound ---------- 2. **S. mexicana.**

1. Sterculia apetala (Jacq.) Karst. Fl. Columb. **2**: 35. 1869.
Helicteres apetala Jacq. Stirp. Amer. 238. *pl. 181.* 1763.
Sterculia carthaginensis Cav. Monad. Diss. 353. 1790.
Sterculia punctata DC. Prodr. **1**: 483. 1824.
Chichaea acerifolia Presl, Rel. Haenk. **2**: 141. 1836.
Sterculia acerifolia Hemsl. Biol. Centr. Amer. Bot. **1**: 126. 1879.

Chiapas, Tabasco, and Yucatán, and probably elsewhere. West Indies, Central America, and South America; type from Cartagena, Colombia.

Tree, 12 to 15 meters high; leaves long-petiolate, 5-lobate, 15 to 30 cm. broad or larger, deeply cordate at base, glabrate above, stellate-tomentose beneath when young but often glabrate in age, the lobes rounded to acutish at apex, entire; panicles longer or shorter than the petioles, many-flowered, the calyx open-campanulate, 2.5 to 3 cm. wide, yellow spotted with purple; carpels of the fruit 10 cm. long, tomentulose, hispid within; seeds oval, about 2 cm. long, castaneous. "Bellota" (Tabasco); "castañas" (the seeds; Tabasco); "castaño" (Guatemala, Honduras); "Panamá" (Nicaragua, Costa Rica); "camajón duro" (Colombia); "camaruca" (Cuba); "anacagüitas" (Porto Rico).

The plant is employed locally for catarrhal and pectoral affections. For an illustration of this species see Contr. U. S. Nat. Herb. 8: *pl. 56.*

2. **Sterculia mexicana** R. Br. in Horsf. Pl. Jav. Rar. 227. 1838–52.

Chiapas and Tabasco; type from Chiapas.

Leaves long-petiolate; leaflets 7 to 9, narrowly oblong-lanceolate, 12 to 30 cm. long, acute or acuminate, petiolulate, sparsely stellate-pubescent at first but soon glabrate, pinnate-nerved; panicles about 30 cm. long, many-flowered; calyx 2 cm. broad, lobed nearly to the base, densly pubescent.

EXCLUDED SPECIES.

Sterculia oblongifolia DC. Prodr. 1: 482. 1824. Described from Mexico, the description based upon one of Sessé and Mociño's drawings. According to Horsfield and Bennett, this is *Cola acuminata* (Beauv.) Horsf. & Benn., the cola nut, an African tree which is cultivated in tropical America. The writer has seen specimens from Jamaica and Costa Rica but none from Mexico.

2. CHIRANTHODENDRON Larreategui, Descr. Chiranthod. 17. 1805.

The genus consists of a single species.

1. **Chiranthodendron pentadactylon** Larreategui, Descr. Chiranthod. 17. 1805.
Cheirostemon platanoides Humb. & Bonpl. Pl. Aequin. 1: 82. *pl. 24.* 1808.
Chiranthodendron platanoides Baill. Hist. Pl. 4: 69, 1873.

Mountains of Oaxaca, and often cultivated elsewhere. Guatemala.

Tree, 12 to 15 meters high, the trunk often 40 cm. in diameter; leaves long-petiolate, 12 to 30 cm. long, acutish to acuminate, deeply cordate at base, irregularly and shallowly 3 to 7-lobate or nearly entire, glabrate above, stellate-tomentose beneath; peduncles short, 1-flowered, opposite the leaves; calyx campanulate, 3.5 to 4.5 cm. long, deeply 5-lobate, green, streaked with red, with a large pit inside at the base of each lobe; petals none; stamen column elongate, dividing into usually 5 branches, these linear, simulating long 2-celled anthers; capsule narrow, about 15 cm. long, deeply sulcate, loculicidally 5-valvate, hispid within; seeds small, black and shining, with a fleshy appendage at the hilum. "Mapasúchil" (the flower; from the Nahuatl, *macpal-xochitl*, "hand-flower"); "macpalxochicuahuitl" (the tree; Nahuatl); "árbol de las manitas," "flor de manitas," "manita de león," "mano de león" (Mexico); "teyaqua" (Michoacán, *León*); "palo de tayuyo," "mano de mico" (Guatemala).

The hand-flower tree is one of the most celebrated of Mexican plants, and was well known to the early inhabitants. It is restricted in its distribution, and for a long time the only tree known to the residents of the Valley of Mexico was one growing at Toluca. Even long after the Conquest this was believed

to be the only tree of its kind, except for its progeny planted elsewhere in the valley. The stamens bear a striking resemblance to a hand and wrist with outspread fingers, and because of the remarkable form of the flowers the tree was viewed with veneration. Trees of this species are of frequent occurrence in the gardens of the City of Mexico and elsewhere.

The tree is figured by Hernández[1] under the name "Macpalxochi Quahuitl," but without description. Cervantes reports that the infusion of the flowers was employed by the Indians of Toluca as a remedy for inflammation of the eyes and for hemorrhoids.[2]

3. FREMONTODENDRON Coville, Contr. U. S. Nat. Herb. 4: 74. 1893.

1. **Fremontodendron mexicanum** Davidson, Bull. South. Calif. Acad. **16**: 50. 1917.

Fremontia mexicana Macbride, Contr. Gray Herb. n. ser. **53**: 14. 1918.

Mountains and foothills of Baja California; described from a cultivated plant, from Ensenada. Southern California.

Shrub or small tree with red-brown branches; leaves long-petiolate, palmately 3 or 5-lobate, 2 to 4.5 cm. long; deeply cordate at base, green above, sparsely stellate-pubescent, whitish or yellowish beneath and covered with a dense close stellate tomentum, the lobes rounded, sometimes again lobate; flowers solitary, opposite the leaves, on short peduncles; calyx open-campanulate, 2.5 to 3.5 cm. long, corolla-like, yellow tinged with red, stellate-pubescent, the lobes rounded and apiculate, each with a large glabrous gland at base; petals none; capsule 4 or 5-valvate, densely hairy.

Fremontodendron californicum (Torr.) Coville is distinguished from *F. mexicanum* by the densely hairy glands at the base of the calyx. It has hard close-grained red-brown wood, with a specific gravity of about 0.71. In California the tree is sometimes known as slippery elm, because of the resemblance of its inner bark to that of *Ulmus fulva*. The genus is named for Col. John Charles Frémont, one of the earliest explorers of the western United States.

4. HELICTERES L. Sp. Pl. 963. 1753.

Trees or shrubs, with stellate pubescence; leaves serrate; flowers axillary, solitary or fasciculate; calyx tubular, 5-dentate; petals 5, equal or unequal, clawed; stamen column elongate, truncate or 5-lobate at apex, each sinus with 1 or 2 anthers; fruit long-stipitate, composed of 5 many-seeded carpels, these straight or usually spirally twisted.

The bark yields a good quality of fiber, suitable for cordage and paper. The plants are mucilaginous and have emollient properties. In Brazil the roots have been used as a remedy for syphilitic affections.

Flowers erect, regular or nearly so; fruit erect on its stipe and pedicel. **1. H. guazumaefolia.**

Flowers horizontal, zygomorphic; fruit recurved or pendent.

Carpels spirally twisted; leaves tomentose beneath _____ **2. H. baruensis.**

Carpels straight; leaves glabrate beneath _____ **3. H. rekoi.**

1. **Helicteres guazumaefolia** H. B. K. Nov. Gen. & Sp. **5**: 304. 1821.

Helicteres mexicana H. B. K. Nov. Gen. & Sp. **5**: 305 1821.

Helicteres carpinifolia Presl, Rel. Haenk. **2**: 138. 1836.

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[1] Thesaurus 383, 459. 1651.

[1] See Mariano Bárcena, El árbol de manitas, Naturaleza **3**: 114–117. 1876.

Sinaloa to Oaxaca, Tabasco, and Veracruz. Cuba, Central America, and South America; type from the Orinoco River.

Shrub, 1 to 3 meters high; leaves short-petiolate, often nearly sessile, oblong-ovate or elliptic-ovate, 5 to 9 cm. long, acute or acuminate, rounded or subcordate at base, dentate, finely or coarsely stellate-pubescent; calyx 1.5 to 2.2 cm. long, hirsute or finely stellate-pubescent; petals spatulate, red, longer than the calyx; gynophore long-exserted; fruit 2 to 3 cm. long, about 8 mm. thick, finely stellate-pubescent. "Majagüilla" (Veracruz, *Ramírez*); "tornillo" (Veracruz); "monacillo colorado" (Oaxaca); "sacatrapo" (Tabasco); "capitanejo" (Michoacán, Guerrero); "palo de capulín" (Guatemala, Honduras); "rabo de puerco" (Costa Rica); "cola de chancho" (Nicaragua); "monecillo" (Guatemala); "guácimo torcido," "guacimillo," "torcidillo" (Panama); "guacimilla" (Sinaloa).

This, apparently, is the species reported by Sessé and Mociño[1] as *H. isora* L.

2. **Helicteres baruensis** Jacq. Enum. Pl. Carib. 30. 1760.

Helicteres mollis Presl, Rel. Haenk. 2: 139. 1836.

Guerrero and Yucatán, and doubtless elsewhere. Central America and northern South America; type from Baru Island.

Shrub, 2.5 meters high; leaves short-petiolate, oval-ovate or elliptic-ovate, obtuse or acute, cordate at base, pale-tomentose beneath, denticulate; flowers numerous; calyx about 3 cm. long; petals red, linear, 4 cm. long; fruit 4 to 5 cm. long, fulvous-tomentose, the gynophore 8 to 12 cm. long, curved.

This is related to *H. jamaicensis* Jacq., which is known in Porto Rico as "cuernecillo," "huevo de gato," and "gato."

3. **Helicteres rekoi** Standl., sp. nov.

Type from Pochutla, Oaxaca, altitude 100 meters (*Reko* 3443; U. S. Nat. Herb. no. 842527).

Branches slender, minutely stellate-pubescent; petioles slender, 2 to 3 cm. long; leaf blades broadly ovate, elliptic, or ovate-elliptic, 8 to 15 cm. long, acute or abruptly acute, rounded or subcordate at base, dentate, thin, green, nearly glabrous above, with scattered stellate hairs beneath; calyx 2.5 cm. long, muricate, minutely stellate-tomentulose, the lobes triangular, 6 to 7 mm. long; petals oblanceolate, 4 cm. long; fruit about 7 cm. long, recurved, the carpels straight, minutely stellate-tomentulose; gynophore 5.5 to 7 cm. long, glabrous.

5. HERMANNIA L. Sp. Pl. 673. 1753.

Low shrubs or herbs, with stellate pubescence; leaves dentate, the stipules foliaceous; flowers small, axillary; calyx 5-lobate; petals 5, obovate, persistent; stamens 5, connate at base; fruit a luculicidal 5-valvate capsule, the cells often cristate dorsally.

Calyx large, inflated, nearly covering the capsule ..... 1. **H. inflata.**
Calyx small and inconspicuous, spreading at the base of the fruit.
  Anthers 5 mm. long, nearly sessile; spines on the angles of the capsule 3 to 4 mm. long ..... 2. **H. palmeri.**
  Anthers 2 mm. long, on long filaments; spines of the fruit usually 2 mm. long or less.
    Flowers solitary in the axils ..... 3. **H. pauciflora.**
    Flowers in axillary cymes ..... 4. **H. texana.**

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[1] Pl. Nov. Hisp. 157. 1887.

1. **Hermannia inflata** Link & Otto, Icon. Pl. Rar. 55. *pl. 28.* 1828.

Puebla and Oaxaca.

Shrub 1 to 2 meters high, densely stellate-pubescent throughout; leaves short-petiolate, rhombic-ovate, 2 to 6 cm. long, acute to rounded at apex, rounded at base, crenate-dentate; flowers subracemose, short-pedicellate, solitary in the upper axils; petals about 1 cm. long; calyx in fruit 1 cm. long, purplish; capsule 10 to 12 mm. long, densely hairy, the angles unarmed.

2. **Hermannia palmeri** Rose, Contr. U. S. Nat. Herb. **1**: 67. 1890.

Baja California; type from La Paz.

Plants low, suffrutescent or herbaceous, densely stellate-pubescent and glandular-pubescent; leaves short-petiolate, 1 to 3 cm. long, rhombic-ovate to rounded-cordate, obtuse or rounded at apex, crenate-dentate; flowers solitary or cymose; petals yellow, 8 to 10 mm. long; anthers connivent; capsule 12 mm. long, the spines slender, glochidiate.

3. **Hermannia pauciflora** S. Wats. Proc. Amer. Acad. **17**: 368. 1882.

Sonora. Southern Arizona, the type from the Santa Catalina Mountains.

Plants low, herbaceous, or suffrutescent at base, rather thinly stellate-pubescent; leaves slender-petiolate, rhombic-ovate, 1 to 3.5 cm. long, obtuse or rounded at apex, truncate or subcordate at base, dentate; pedicels slender; petals yellow, 8 mm. long; capsule 8 to 12 mm. long, thinly pubescent, the marginal spines very short.

4. **Hermannia texana** A. Gray, Gen. Fl. Amer. **2**: 88. *pl. 135.* 1849.

Tamaulipas, Coahuila, Nuevo León, and San Luis Potosí. Western Texas.

Plants herbaceous or suffrutescent, 60 cm. high or less, densely stellate-pubescent; leaves oblong-ovate to rounded, usually rounded at apex, rounded or subcordate at base, dentate or sinuate-dentate; petals dull red, 8 mm. long; capsule 10 to 12 mm. long, densely hairy.

6. WALTHERIA L. Sp. Pl. 673. 1753.

Reference: Rose, Synopsis of the North American species of *Waltheria*, Contr. U. S. Nat. Herb. **5**: 183–185. 1899.

Shrubs or herbs, sometimes small trees, the pubescence mostly stellate; leaves serrate or dentate; flowers small, glomerate, the glomerules axillary, sessile or pedunculate; calyx 5-lobate; petals 5, persistent in fruit; stamens 5, the filaments wholly or partially connate; fruit a 1-seeded capsule.

The only other Mexican species of the genus, *W. operculata* Rose, is an annual plant with broad stipules, the capsule opening by a lid. In the species listed below the stipules are linear and the capsule is loculicidally dehiscent.

Leaves long-acuminate, acutely dentate, glabrous or nearly so. **1. W. acuminata.**

Leaves acute to rounded at apex, crenate or obtusely dentate.

- Leaves large, mostly 7 to 15 cm. long, distichous; large shrubs.
  - Filaments united to the summit leaves broadly ovate ..... **2. W. brevipes.**
  - Filaments united only at base; leaves elliptic-oblong or obovate-oblong. **3. W. glomerata.**
- Leaves small, mostly 2 to 7 cm. long, not conspicuously if at all distichous; small shrubs or herbs.
  - Lobes of the calyx much shorter than the tube.
    - Petals much exceeding the calyx ..... **4. W. preslii.**
    - Petals not exceeding the calyx.
      - Leaves glabrous beneath in age; flowers in large panicles. **5. W. alamosana.**

Leaves pubescent beneath in age; flowers in small dense clusters.
Calyx 4 to 4.5 mm. long; leaves green beneath, thinly stellate-pubescent ---------- 6. W. pringlei.
Calyx 6 mm. long; leaves whitish beneath, densely stellate-tomentulose ---------- 7. W. conzattii.
Lobes of the calyx nearly or quite as long as the tube.
Filaments united to form a tube ---------- 8. W. americana.
Filaments free above.
Leaves acute; petals purple ---------- 9. W. hirsuta.
Leaves obtuse or rounded at apex; petals yellow -- 10. W. acapulcensis.

1. **Waltheria acuminata** Rose, Contr. U. S. Nat. Herb. 5: 183. 1899.

Known only from the type locality, Culiacán, Sinaloa.

Slender shrub; leaves ovate-cordate, thin, green, 8 to 12 cm. long, shallowly cordate at base, long-petiolate; flower clusters short-pedunculate; calyx lobes half as long as the tube; filaments united to above the middle.

2. Waltheria brevipes Turcz. Bull. Soc. Nat. Moscou 31[1]: 213. 1858.

Veracruz and Oaxaca; type from San Pedro Nolasco, Oaxaca. Costa Rica.

Shrub or small tree, 2.5 to 7.5 meters high; leaves short-petiolate, acute or obtuse, subcordate at base, rugose, finely stellate-tomentulose, pale beneath; flower clusters large, dense, mostly sessile; calyx 6 to 7 mm. long, the lobes half as long as the tube.

3. Waltheria glomerata Presl, Rel. Haenk. 2: 152. 1836.

Veracruz. Panama (type locality).

Shrub, 1.5 to 3 meters high; leaves short-petiolate, acute, obtuse or rounded at base, rugose, finely stellate-pubescent, pale beneath, at least when young, finely dentate; flower clusters large, sessile; calyx 6 mm. long, the lobes short; petals white, exserted.

The leaves are said to be used in Panama as a hemostatic.

4. **Waltheria preslii** Walp. Repert. Bot. 1: 340. 1842.

Waltheria rotundifolia Presl, Rel. Haenk. 2: 151. 1836. Not *W. rotundifolia* Schrank, 1828.

Known only from the vicinity of Acapulco, Guerrero, the type locality.

Stems suffrutescent, usually prostrate; leaves broadly ovate or rounded, long-petiolate, obtuse or rounded at apex, cordate at base, densely stellate-tomentose; flower clusters mostly pedunculate; calyx 4 to 5 mm. long; petals yellow.

5. **Waltheria alamosana** Standl., sp. nov.

Type from Alamos, Sonora (*Rose, Standley & Russell* 12714; U. S. Nat. Herb. no. 635525).

Shrub, 1 to 1.5 meters high, the branches dark reddish brown, very minutely and sparsely stellate-pubescent or glabrate; leaves ovate, 3 to 6 cm. long, long-petiolate, obtuse to acuminate, cordate or subcordate at base, coarsely crenate, when young minutely stellate-pubescent but soon becoming glabrous; flowers loosely cymose-paniculate, sessile; calyx cylindric, 6 mm. long, 5-angulate, costate between the angles, minutely stellate-pubescent, the lobes half as long as the tube, narrowly triangular, acuminate.

6. **Waltheria pringlei** Rose & Standl., sp. nov.

Guerrero and Morelos; type from limestone mountains above Iguala, Guerrero, altitude 1,200 meters (*Pringle* 8422; U. S. Nat. Herb. no. 381847).

Shrub, 1 to 2.5 meters high; leaves short-petiolate, lance-ovate or ovate, 3.5 to 7 cm. long, acute, rounded or subcordate at base, coarsely and obtusely den-

tate, thin, green, minutely stellate-pubescent; flower clusters dense, mostly sessile; calyx 4 to 4.5 mm. long, the lobes short, narrowly triangular, acute, minutely tomentose; petals much shorter than the calyx; filaments free above; capsule loculicidal.

Collected also at Yautepec, Morelos, by Pringle (no. 9691).

7. Waltheria conzattii Standl., sp. nov.

Type from Salina Cruz, Oaxaca, altitude 50 meters (*Conzatti* 3682; U. S. Nat. Herb. no. 989568).

Shrub; leaves long-petiolate, rounded-ovate or rhombic-ovate, 3 to 8 cm. long, obtuse, rounded or shallowly cordate at base, crenate-dentate, thick, densely velvety-tomentose; flower clusters loose, few-flowered, short-pedunculate; calyx 6 mm. long, velutinous-tomentose, the lobes half as long as the tube, narrowly triangular, acute; petals nearly as long as the calyx; filaments united for less than half their length.

8. Waltheria americana L. Sp. Pl. 673. 1753.

Waltheria indica L. Sp. Pl. 673. 1753.

Waltheria detonsa A. Gray, Pl. Wright. **2**: 24. 1853.

Nearly throughout Mexico. Widely distributed in the warmer parts of both hemispheres.

Shrub, sometimes 2.5 meters high, or often herbaceous, frequently decumbent; leaves on long or short petioles, oblong to rounded-ovate, obtuse to rounded at apex, obtuse to subcordate at base, crenate-dentate, usually thick and densely tomentose, but the pubescence variable in amount and quality; flower clusters usually dense, sessile or often long-pedunculate; petals yellow, longer than the calyx. "Malva" (Sinaloa); "malva del monte" (Yucatán); "hierba del soldado" (Tamaulipas); "malva blanca" (Cuba); "basora prieta," "malvavisco" (Porto Rico); "bretónica" (Venezuela).

The flowers are sweet-scented. The plant is mucilaginous and emollient, and febrifuge and antisyphilitic properties have been ascribed to it. In Tamaulipas a decoction is employed as a remedy for eruptions of the skin, and in Colima the decoction is used to wash wounds. The plant is said to possess some forage value.

9. Waltheria hirsuta Presl, Rel. Haenk. **2**: 152. 1836.

Described from western Mexico.

Leaves ovate-cordate, acute, obtusely dentate, whitish-tomentose beneath, about 3.5 cm. long; flower clusters, long-pedunculate; petals exserted.

No material referable to this species has been seen by the writer.

10. Waltheria acapulcensis Rose, Contr. U. S. Nat. Herb. **5**: 184. 1899.

Known only from the type locality, Acapulco, Guerrero.

Leaves slender-petiolate, oblong or oblong-ovate, 2.5 to 6 cm. long, rounded or cordate at base, green, stellate-pubescent; flower clusters small, mostly pedunculate; calyx 3 to 4 mm. long; petals yellow, exserted.

7. PHYSODIUM Presl, Rel. Haenk. 2: 150. 1836.

Shrubs or small trees; flowers cymose-paniculate, terminal; calyx campanulate, 5-dentate, 5-angulate, accrescent, inflated, reticulate-veined; petals 5; stamen column dividing above into 5 short filaments; capsule small, stipitate, included in the calyx, luculicidally 5-valvate, the cells 1-seeded.

Pubescence not glandular; petals exserted from the calyx_____**1. P. dubium.**
Pubescence of the inflorescence chiefly of gland-tipped hairs; petals included. **2. P. corymbosum.**

1. Physodium dubium Hemsl. Diag. Pl. Mex. 4. 1878.

Morelos, Guerrero, Puebla, and Oaxaca; type collected between Acatlán and Chila, Puebla.

Shrub or small tree, 2 to 6 meters high; leaves slender-petiolate, broadly ovate or ovate-cordate, 5 to 12 cm. long, acute to cuspidate-acuminate, subcordate and oblique at base, serrulate, densely stellate-pubescent, green; calyx in fruit 1.5 to 2 cm. long, pale red or purple; petals pale blue; capsule about 6 mm. long.

The calyx in this and the following species is similar to that of the genus *Physalis*. In its form and coloration it suggests also the showy bracts of the genus *Bougainvillea*.

2. Physodium corymbosum Presl, Rel. Haenk. **2**: 150. *pl. 72*. 1836.

Jalisco, Colima, and Guerrero.

Shrub, 3 meters high; leaves similar to those of *P. dubium*, but less pubescent; calyx in fruit 2.5 to 3.5 cm. long, purple, the lobes obtuse or acute; petals oblanceolate, much shorter than the calyx; capsule 6 mm. long.

2a. Physodium corymbosum acuminatum Rose, Contr. U. S. Nat. Herb. **1**: 309. 1895.

Sinaloa, Jalisco, and Michoacán; type from Jalisco.

Shrub or small tree, 2 to 4 meters high, with gray bark; leaves like those of the species; calyx in fruit 3 to 4 cm. long, yellowish or purple, the lobes acuminate. "Rechinador" (Sinaloa).

The form of the calyx is decided different from that of typical *P. corymbosum*, but there appear to be intermediate forms, and no other distinctive character is apparent.

8. MELOCHIA L. Sp. Pl. 774. 1753.

Shrubs or herbs, the pubescence of simple or stellate hairs; leaves dentate; flowers mostly small, cymose or in dense axillary glomerules; calyx 5-lobate; petals 5, spatulate, persistent; stamens 5, connate at the base or higher; capsule 5-celled, loculicidally 5-valvate, the cells 1-seeded, the carpels easily separating, sometimes indehiscent.

Capsule pyramidal.
- Leaves glabrous or nearly so, green; capsule glabrous or glabrate, very short-stipitate ---- **1. M. pyramidata.**
- Leaves densely stellate-tomentose, usually whitish beneath; capsule densely pubescent, on a comparatively long stipe ---- **2. M. tomentosa.**

Capsule depressed-globose.
- Flowers all or mostly on long pedicels, the pedicels glabrous except for a few weak gland-tipped hairs.
  - Carpels of the fruit splitting along the back from apex to base; bractlets present at the base of the calyx and exceeding it in length. 3. M. glandulifera.
  - Carpels splitting along the back from the apex halfway to the base; bractlets none at base of calyx ---- **4. M. interrupta.**
- Flowers sessile or nearly so, densely glomerate in the leaf axils; gland-tipped hairs absent, or mixed with stellate ones.
  - Bracts of the inflorescence linear-subulate, green ---- **5. M. hirsuta.**
  - Bracts lanceolate or broader, dry, brown.
    - Stamens shorter than the styles.
      - Leaves glabrous beneath or with scattered appressed hairs; inflorescence without viscid pubescence ---- **6. M. nodiflora.**

Leaves densely pubescent beneath with minute spreading hairs; inflorescence viscid-pubescent ---------- **7. M. tragiaefolia.**

Stamens longer than the styles.

Lower surface of leaves covered with rather long, appressed hairs, or rarely glabrate ---------- **8. M. urticaefolia.**

Lower surface of leaves covered with minute spreading hairs. **9. M. tomentella.**

1. Melochia pyramidata L. Sp. Pl. 774. 1753.

Nearly throughout Mexico. Widely distributed in the warmer portions of both hemispheres.

Slender shrub, 1 to 2 meters high, or often herbaceous; leaves slender-petiolate, oblong to rounded-ovate, acute or obtuse, rounded at base, serrate, green, often glabrous but frequently sparsely pubescent; flowers in axillary corymbs, mostly pedicellate; petals violet, about 7 mm. long; capsule 5 to 6 mm. long and somewhat broader, the lobes broadened at the base, acute and spreading. "Suponite" (Oaxaca); "malva común," "malva cimarrona" (Cuba); "bretónica" (Porto Rico).

The plant is eaten by stock.

2. Melochia tomentosa L. Syst. Nat. ed. 10. 1140. 1759.

Melochia plicata Presl, Rel. Haenk. **2**: 145. 1836.

Melochia speciosa S. Wats. Proc. Amer. Acad. **24**: 42. 1889.

Melochia arida Rose, Contr. U. S. Nat. Herb. **8**: 321. 1905.

Nearly throughout Mexico. Widely distributed in the warmer parts of the Western Hemisphere.

Shrub, 0.5 to 2.5 meters high; leaves on long or short petioles, oblong to broadly rhombic-ovate, rounded to acutish at apex, rounded or subcordate at base, crenate or dentate, thick, usually densely and finely tomentose on both surfaces; flowers in loose cymes, mostly pedicellate; petals pink to violet, 8 to 18 mm. long; fruit 7 to 9 mm. long, long-beaked, the lobes rounded to acutish below. "Malvavisco" (Porto Rico); "bretónica" (Porto Rico, Venezuela); "malva," "varita de San José" (Nicaragua).

The plants vary considerably in size of flowers and leaves, in density of pubescence, and in form of the fruit, but none of the proposed segregates seem worthy of recognition. *M. arida* is a small-leaved form of dry regions. *M. speciosa* is a form with unsually large flowers and rather scant pubescence. Watson compared the latter, in his original description, with *M. pyramidata*, from which, of course, it is amply distinct. To the present writer it seems not improbable that *M. pyramidata* and *M. tomentosa* may at times hybridize.

3. Melochia glandulifera Standl., sp. nov.

Type from Tonalá, Chiapas (*Purpus* 6925; U. S. Nat. Herb. 567212).

Branches slender, sparsely furnished with short weak simple gland-tipped hairs; leaves slender-petiolate, deltoid-lanceolate or lance-ovate, acute or acuminate, rounded at base, serrate-dentate, thin, glabrous beneath, with a few scattered hairs above; flowers in lateral cymes, mostly long-pedicellate, the bractlets linear, ciliate, more than twice as long as the calyx; calyx lobes shorter than the tube, cuspidate-acuminate; petals purple, 5 mm. long; fruit subglobose, 4.5 mm. in diameter, setulose-hirtellous and also with slender gland-tipped hairs.

4. Melochia interrupta (Schlecht.) Hemsl. Biol. Centr. Amer. Bot. **1**: 131. 1879.

Riedlea interrupta Schlecht. Linnaea **11**: 375. 1837.

Veracruz; type from Hacienda de la Laguna.

Plants about 1 meter high, sometimes wholly herbaceous, the stems hirsute and glandular-pilose; leaves short-petiolate, narrowly lanceolate to broadly ovate, acute or acuminate, serrate, thinly pilose or glabrate; inflorescence chiefly terminal, open; petals 6 mm. long; fruit 5 mm. in diameter.

5. **Melochia hirsuta** Cav. Monad. Diss. 323. *pl. 175. f. 1.* 1788.
Riedlea serrata Vent. Choix Pl. Cels *pl. 37.* 1803.
Melochia serrata St. Hil. & Naud. Ann. Sci. Nat. II. **18**: 36. 1842.
? *Riedlea jurgensenii* Turcz. Bull. Soc. Nat. Moscou **31**[1]: 211. 1858.
Riedlea heterotricha Turcz. Bull. Soc. Nat. Moscou **31**[1]: 211. 1858.
Jalisco to Veracruz and Oaxaca. West Indies, Central America, and South America.
Low shrub or herb; leaves short-petiolate, oblong to rhombic-ovate, 2 to 7 cm. long, rounded to acuminate at apex, rounded or cordate at base, serrate, green, pilose or glabrate; flowers in dense sesile clusters, these usually forming a terminal spike; bracts hirsute; petals purple, 8 to 12 mm. long. "Raíz de toro" (Costa Rica); "estancadera" (Colombia); "bretónica" (Porto Rico); "malva mora" (Cuba).

6. **Melochia nodiflora** Swartz, Prodr. Veg. Ind. Occ. 97. 1788.
Guerrero to Veracruz and Oaxaca. West Indies and Central America.
Slender shrub, sometimes 2 meters high; leaves slender-petiolate, mostly ovate, acute or acuminate, rounded or subcordate at base, serrate, thin, green, usually glabrous or nearly so; flowers mostly in dense axillary glomerules; petals pink or purple. "Malva colorada" (Cuba); "mozote de monte" (Nicaragua); "bretónica," "bretónica prieta" (Porto Rico).

7. **Melochia tragiaefolia** Standl., sp. nov.
Type from La Salada, Michoacán (*Nelson* 6927; U. S. Nat. Herb. 399266).
Branches red-brown, glandular-pilose when young; leaves slender-petiolate, ovate-cordate, acute or acuminate, 4 to 5.5 cm. long, coarsely dentate, thin, green, minutely velutinous-pilosulous on both surfaces; bracts ovate, brown; calyx densely glandular-pubescent, the lobes ovate-lanceolate, acuminate, about as long as the tube; petals 6 mm. long; fruit glandular-pubescent, the 5 carpels easily separating, tardily dehiscent.

8. **Melochia urticaefolia** (Turcz.) Standl.
Riedlea urticaefolia Turcz. Bull. Soc. Nat. Moscou **31**[1]: 209. 1838.
Jalisco to Morelos and Oaxaca; type from Oaxaca.
Slender shrub, 1 to 2 meters high; leaves slender-petiolate, ovate-lanceolate to broadly ovate, acute or acuminate, rounded or subcordate at base, dentate, thin, green, sparsely appressed-pilose on the upper surface or glabrate; petals purple, 7 to 10 mm. long.
It is doubtful whether the name *urticaefolia* really belongs to this plant, or whether it is not rather a synonym of *M. nodiflora.* In the latter case the present plant appears to be without a name, unless it may be *M. corymbosa* (DC.) Hemsl.

9. **Melochia tomentella** (Presl) Hemsl. Biol. Centr. Amer. Bot. **1**: 132. 1879.
Riedlea tomentella Presl, Rel. Haenk. **2**: 148. 1836.
Sinaloa to Oaxaca; type from Acapulco, Guerrero.
Slender shrub; leaves mostly short-petiolate, ovate-lanceolate, long-acuminate, rounded or subcordate at base, coarsely dentate, thin, green; flowers all in dense axillary glomerules; petals 5 to 8 mm. long. "Malva de los cerros" (Sinaloa).
The plant is said to yield a good quality of fiber.

DOUBTFUL SPECIES.

MELOCHIA CORYMBOSA (DC.) Hemsl. Biol. Centr. Amer. Bot. 1: 130. 1879. *Riedlea corymbosa* DC. Prodr. 1: 491. 1824. Described from Mexico.

MELOCHIA SCUTELLARIOIDES (Turcz.) Hemsl. Biol. Centr. Amer. Bot. 1: 131. 1879. *Riedlea scutellarioides* Turcz. Bull. Soc. Nat. Moscou 31[1]: 210. 1858. Type from Mirador, Veracruz.

MELOCHIA TENELLA (Turcz.) Hemsl. Biol. Centr. Amer. Bot. 1: 132. 1879. *Riedlea tenella* Turcz. Bull. Soc. Nat. Moscou 31[1]: 212. 1858. Type from Sierra San Pedro Nolasco, Oaxaca. Probably a synonym of *M. hirsuta*.

9. THEOBROMA L. Sp. Pl. 782. 1753.

Trees; leaves large, entire, pinnate-nerved, or 3 or 5-nerved at base; flowers small, in axillary or lateral clusters, often along the trunk; calyx 5-lobate; petals 5, clawed, cucullate at base, produced above into a spatulate blade; calyx tube 5-lobate, the anthers 2 or 3 in each sinus; fruit large, sessile, fleshy, 5-celled, the seeds surrounded by pulp.

Leaves green beneath, glabrous or nearly so ..... 1. T. cacao.
Leaves minutely whitish-tomentulose beneath.
Leaves obtuse at base; petals longer than the calyx ..... 2. T. angustifolium.
Leaves deeply or shallowly cordate at base; petals shorter than the calyx. 3. T. bicolor.

1. Theobroma cacao L. Sp. Pl. 782. 1753.

In forests from Colima to Chiapas and Tabasco, and cultivated extensively in the warmer parts of Mexico. Central America; cultivated in the Tropics of both hemispheres.

Small evergreen tree, 6 to 8 meters high, or sometimes larger, with spreading branches, the lateral branches in clusters of 5, rarely 4 or 6, the young shoots hirsute or hirtellous; leaves short-petiolate, elliptic-oblong or obovate-oblong, 15 to 30 cm. long, rounded or obtuse at base, abruptly acuminate at apex, thick; inflorescences small, fleshy, borne along the trunk and main branches; flowers long-pedicellate, the calyx pink, its lobes lance-acuminate, 6 to 7 mm. long; petals yellowish; fruit 30 cm. long and 10 cm. thick or smaller, elliptic-ovoid, with a thick fleshy rind, longitudinally ridged and furrowed, red, yellow, purplish, or brown, each cell containing 5 to 12 large, brown or purple seeds embedded in white or pinkish, acid pulp.

The word "cacao" is the name of the plant and of the crude product from it. Cocoa and chocolate are manufactured products obtained from the seeds. The word "cacao" is derived from the Nahuatl "cacahuatl" (written also *cacahoatl*), a term which in modern Mexican has been corrupted into "cacahuate," the name applied to the peanut, the application evidently because of the resemblance of the peanut to cacao fruit. The Nahuatl name for the cacao tree is "cacahuacuahuitl," which has been written also as "cacaotlquahuitl," "cacauquauitl," and in various other ways. The following additional names are reported from Mexico: "Bizoya," "yagabizoya" (Oaxaca, Zapotec, *Reko*); "dēqhy" (Otomí, *Buelna*); "caocauatzaua" (Zoque, *Gonzales*); "kako" (Mixe); "cahequa" (Tarascan, *León*); "chudechu" (Otomí).

Of all the numerous vegetable productions of the New World, and especially of Mexico, none is more celebrated than the product of the cacao plant, which attained high favor in Europe immediately after the Conquest. Oviedo, who describes the plant at great length, states that it was not found in the West Indies, but only on the continent, especially in Mexico, and he terms it "the most precious tree of the Indians and the most highly esteemed."

Cacao in its wild state was well known to the early inhabitants of Mexico, and it was also cultivated, although to what extent is uncertain. The use of the drink made from the seeds was confined chiefly to the higher classes, but the use of the seeds as money was a matter of importance to all classes, for cacao seeds were the basis of the Mexican financial system. They are still used locally in Mexico as a substitute for small coins. Jourdanet, in his translation of Sahagún,[1] gives the following account of the use of cacao as currency: "It would be idle to call attention to this plant, whose fruit is so widely used to-day, if it were not of interest to recall the fact that cacao was unknown in Europe before the discovery of America. The Mexicans at the time of the Conquest made much use of it, in various forms, none of which was the equivalent of our chocolate. This precious fruit was besides, for the richest among them, a means of treasuring their wealth, and a medium of exchange, which facilitated commerce as does our money. This custom was even extended after the Conquest in certain parts of the country, so long, in fact, that I myself observed in Yucatán, before 1850, that cacao seeds were used in place of copper coins.

"It would be very difficult to determine what was the value set upon the cacao employed as money in ancient Mexico. * * * However, in the part of the country where cacao has continued in use as currency up to the present time, its value in ordinary market transactions is not the same as that assigned to it when it is sold at wholesale as a food. The cacao seed, as money, keeps a conventional value which, as a rule, is much greater than its market price. That is to say, its usage in this sense is limited to transactions of little importance, as a means of making small change, in the Provinces where copper coins are not in circulation.

"To return to ancient times, we may take the judicious and always reliable accounts of M. García Icazbalceta, and state that, 'in accordance with the numeral system of the Mexicans, the base for counting cacao seeds was the number 20. Thus, 400 seeds (20×20) formed a *tzontli*. We know that *tzontli* in the Nahuatl language means four hundred. Even to-day it is the custom in the City of Mexico to sell fire-wood by *tzontles* of 400 sticks. Twenty *tzontlis*, that is 8,000, made a *xiquipilli*, and three *xiquipilli* a load, which therefore consisted of 24,000 seeds. Since this system of accounting was clumsy and could result in abuses, it was forbidden by an official order of January 28, 1527. It was forbidden to sell cacao by count of the seeds, and ordered that the sale should take place by full measure, guaranteed by the municipal seal. Later, by an order of October 24, 1536, it was decreed, on the contrary, that the seeds should be counted for sale, and that no other method should be followed.'

"We have stated above that the Mexican nobles used cacao as a means of hoarding their fortunes. The twofold use made of it, as food and as money, caused it to rank as a basic element of wealth. The districts which produced cacao paid it as tribute to the rulers, in vast quantities. Torquemada states that in the palace of the famous King of Tetzcuco, Netzahualcoyotl, there was expended every year 2,744,000 *fanegas* of cacao (the *fanega* is the equivalent of about 40 kilograms). That is scarcely credible, although this author assures us that he had seen the book of accounts approved by a grandson of the King. Both Torquemada and the chronicler Herrera report that the Indian auxiliaries of Cortés pillaged a cacao granary belonging to Monteuhçoma, where they found more than 4,000 loads. The seeds were stored in osier baskets so large that six men taking hold of hands could not span them. The amount carried away was 600 loads, for which it was necessary to empty only six baskets.

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[1] Histoire générale des choses de la Nouvelle-Espagne, p. 866. 1880.

"It would be difficult to give an exact idea of the extent and character of the lands employed to advantage by the ancient Mexicans for the culture of cacao. It is certain that the chief places of production were to the south of the country, bordering on Guatemala. It is there that this precious plant is still cultivated, and to-day as in former times it is the district of Soconusco which gives the product of best quality."

Oviedo states that those persons who had cacao trees growing upon their lands were considered rich. "In the province of Nicaragua," he relates, "a rabbit is worth 10 seeds, and for four you can buy eight *nísperos;* a slave is worth a hundred, more or less. * * * Even with these seeds there are ways of cheating, such as putting false or empty shells among a quantity of them. These spurious ones are prepared by separating the shell and filling it with earth or some other substance, then the shell is closed so carefully that the substitution is not perceptible. He who receives them, when he counts them, touches them one by one with the forefinger, and no matter how well the counterfeit has been performed, it is detected by the touch." Acosta mentions the fact that cacao seeds were given as alms to the poor. Bernal Díaz del Castillo relates how upon his return to Mexico after his long journey back from Guatemala, Cortés "sent us presents of necessaries, likewise gold and cacao for our expenses."

Theobroma cacao is the principal source of the chocolate and cocoa of commerce, but other species also are planted, some of them extensively. Cacao is grown commercially in Mexico, especially in Chiapas and Tabasco. At an early date it was introduced into the Canaries and Philippines, and now it is grown extensively in many parts of the Old World tropics. Numerous minor varieties, differing in the form of the fruit, are known. The quality of the product varies greatly in different countries. The young trees must be grown under shade. Chocolate is the term applied to sweetened preparations of the roasted and ground cacao seeds, with a large proportion of the original fat retained. Cocoa is prepared in the same way, but most of the fat is removed from it.

The original inhabitants of Mexico sometimes ate the seeds either green or dry, but the seeds were used chiefly for the preparation of a drink known as "xocoatl," this being the term from which the word chocolate is obtained. The word *xocoatl* signifies "sour water," the unsweetened decoction of the seeds being unpleasantly bitter. The drink as prepared by the Mexicans was different from the chocolate as now usually prepared. It consisted of a strong decoction of the seeds, flavored with chile, maize, honey, ceiba seeds, and many other substances, and the beverage was beaten into a foam which dissolved almost imperceptibly upon the tongue. It was often colored with *Bixa orellana.* It was the favorite drink of the Mexican nobility, who consumed immense quantities of it. It was a favorite also of the emperor, for whom almost incredible quantities were prepared every day. A drink still much used in some parts of Mexico is "chilate" (in Nahuatl *chilatl,* chile-water, or *chilcacohuatl*), which is made from cacao, chile, and water. Similar drinks are prepared also by the addition of other substances.

Chocolate was one of the first Mexican products to come to the notice of the Spanish invaders of Mexico, all of whom were enthusiastic in its praises. Cortés mentions it in his letters to the King of Spain. After the Conquest it was an esteemed drink among the Spanish settlers, and it is related that in Chiapas the ladies had it brought to them even in the churches, until the bishop forbade the servants who brought it to enter the church buildings. Acosta is a unique exception to the Spanish proponents of chocolate. He says:

"They esteem it highly in this country, foolishly and for no good reason, for it injures the hearts of those who are not accustomed to it, and there is a froth on top of it which is very unpleasant if one is not accustomed to it. * * * Those who are not accustomed to it from childhood care little for it." Acosta, however, found little to praise in the New World.

Cacao seeds contain 45 to 50 per cent of oil, or cacao butter, which is much used in pharmacy for making ointments. They also contain an alkaloid, theobromine. The oil was used by the inhabitants of Mexico for treating wounds, and the beverage made from the seeds was considered beneficial to the health. Oviedo reports a belief that if a person drank chocolate for breakfast, the bite of a poisonous serpent would not be fatal to him.

Cacao is illustrated and described at length by Hernández.[1]

2. **Theobroma angustifolium** DC. Prodr. **1**: 484. 1824.

Chiapas and Tabasco, and perhaps elsewhere. Central America.

Small tree with spreading crown, the bark smooth; leaves oblong or oblong-oblanceolate, 13 to 25 cm. long, abruptly acuminate, somewhat oblique at base, green above, glabrous or nearly so, whitish beneath; flowers yellow, borne on the young branches, the clusters few-flowered; petals about 1 cm. long; fruit oval, dark chestnut or cinnamon-brown, smaller than in *T. cacao.* "Cushta" (El Salvador); "cacao de mico," "cacao silvestre" (Costa Rica).

This species is one of the important cacao plants of Mexico, and the notes given above under *T. cacao* apply in large part to it also. In Chiapas *Theobroma angustifolium* is the species generally grown. The region of Soconusco has long been famous for its chocolate, derived from this species, and for many years the supply for the royal family of Spain was brought from Soconusco.

3. **Theobroma bicolor** Humb. & Bonpl. Pl. Aequin. **1**: 104. *pl. 30.* 1808.

Theobroma ovatifolia DC. Prodr. **1**: 485. 1824.

Tribroma bicolor Cook, Journ. Washington Acad. Sci. **5**: 288. 1915.

Chiapas and Tabasco, and perhaps elsewhere. Central America and northern South America; type from Colombia.

Slender tree, the upright shoots each ending in a cluster of 3 lateral branches; leaves dimorphous, those of the upright shoots rounded-cordate, very large (sometimes 50 cm. long), long-petiolate, deeply cordate at base; leaves of lateral branches short-petiolate, oblong-ovate, 15 to 30 cm. long, abruptly short-pointed, shallowly cordate at base, green and nearly glabrous above, whitish beneath; flowers borne on the young branches, in loose panicles, reddish purple; fruit ellipsoid, about 15 cm. long, ribbed and irregularly netted, dark, with a thick woody shell, the pulp white.[2] "Cacao blanco," "pataste" (Chiapas); "patatle" (Tabasco); "pataxte" (Tabasco, Guatemala); "bacao" (Colombia); "pataste," "pataiste," "cacao silvestre," "teta negra" (Costa Rica).

This plant is cultivated in some parts of tropical America, and the seeds are used like those of *T. cacao.* Their product is variously known in commerce as "tiger," "wariba," or "patashte" cacao. The seeds are used locally for the preparation of sweetmeats.

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[1] Thesaurus 79–81. 1651.

[2] For a full account of this species see O. F. Cook, Branching and flowering habits of cacao and patashte, Contr. U. S. Nat. Herb. **17**: 609–625. *pl. 44–54.* 1916.

10. GUAZUMA Adans. Fam. Pl. 2: 382. 1763.

1. **Guazuma ulmifolia** Lam. Encycl. **3**: 52. 1789.
Theobroma guazuma L. Sp. Pl. 782. 1753.
Guazuma polybotrya Cav. Icon. Pl. **3**: 51. *pl. 299*. 1794.
Guazuma tomentosa H. B. K. Nov. Gen. & Sp. **5**: 320. 1821.
Guazuma guazuma Cockerell, Bull. Torrey Club **19**: 95. 1892.

Nearly throughout Mexico except Baja California. Widely distributed in tropical America.

Shrub or tree, 2 to 20 meters high; leaves short-petiolate, oblong to broadly ovate, 4 to 16 cm. long, acute to long-acuminate, rounded to deeply cordate and usually very oblique at base, serrulate, green and glabrate, or more commonly stellate-tomentose, at least beneath; flowers small, yellowish green or whitish, sweet-scented, in axillary cymes; calyx 2 or 3-parted, stellate-tomentose; petals 5, about 3 mm. long, cucullate; short-clawed, produced above into a bifid ligule; fruit a globose or oval, woody capsule, 2 to 4 cm. long, densely tuberculate, imperfectly 5-valvate at apex; seeds numerous in each cell. "Tablote" (Michoacán, Guerrero); "cuaulote" or "cuahulote" (Guerrero, Oaxaca, Chiapas; from the Nahuatl, *cuau-olotl*); "pixoi" or "pixoy" (Yucatán, Maya); "palote negro" (Chiapas); "majahua de toro" (Sinaloa); "guácima" or "guácimo" (Sinaloa, Tabasco, Tamaulipas, Jalisco, Veracuz, Colima, Oaxaca, Durango, Porto Rico, Santo Domingo, Costa Rica, Colombia, Venezuela; a Carib name, often written incorrectly as "guásima" or guázima"); "aquiche" (Tamaulipas, *Escontria*); "vácima" (Michoacán, *León*); "yaco granadillo" (Oaxaca, *Reko*); "bulines" (*Nueva Farm. Mex.*); "guácima boba" (Cuba); "caulote" (Guatemala); "guácimo colorado" (Colombia); "cablote" (Guatemala, Honduras); "guácimo macho" (Venezuela); "guacimillo" (Nicaragua). The name "guayacán" has been reported as in use in Mexico for this species, but the report is probably incorrect.

The trunk is often 30 to 40 cm. in diameter, and is covered with rough or smooth, gray or blackish bark. The wood is light, fibrous and coarse-grained, grayish, slightly tinged with red or pink, with a specific gravity of 0.552 to 0.580. It is rather strong and resistant, and has been employed for ribs of small boats, shoe lasts, barrel staves, house furniture, paneling, firewood, and other purposes, and as a source of charcoal for gunpowder. The young stems yield a strong fiber, suitable for making rope. The juice has been employed to clarify syrup in the manufacture of sugar. Silkworms have been fed on the leaves and stock browse upon the leaves and young shoots.

The fruit is green at first but black at maturity. When fresh it is rather fleshy or pulpy and mucilaginous, and has a pleasant, sweet flavor. It is sometimes eaten by people, especially in times of scarcity, either raw or cooked. Sometimes, when dry, it is ground and then cooked. Pigs are said to be fond of it. The flowers are said to furnish a good quality of honey.

The plant is much employed in domestic medicine. The bark and other parts are administered for malaria, cutaneous and syphilitic affections, elephantiasis, diseases of the chest, leprosy, and other diseases. The plant has emollient and astringent properties.

Oviedo (Lib. VIII, Cap. VII) gives the following account of the tree: "The Guaçuma is a large tree that bears fruit like mulberries, and the leaves are like those of the mulberry-tree, but smaller. From the fruit the Indians make a beverage on which they fatten like pigs; for this they mash the fruit and put it in water, and after using it for a few days the Indians appear fat, and likewise horses, if they will drink it, for other animals do not like it. The wood of this tree is very light, and of it the Indians of Tierra-Firme make their

carrying-sticks. This tree is common in all the Indies; I say common, for it is found in these islands and in Tierra-Firme, and it is one of the best trees for wood that can be found, and excellent for making powder; this I have tried in making ammunition for the fortress of the city of Sànto Domingo; and experienced powder makers say that no other wood is so good for making the best powder, not even German willow or filbert branches."

The tree is illustrated by Hernández[1] under the names of "quaucholotl" and "guácimo."

11. NEPHROPETALUM Robins. & Greenm. Bot. Gaz. 22: 168. 1896.

A single species is known.

1. Nephropetalum pringlei Robins. & Greenm. Bot. Gaz. 22: 168. 1896.

Known only from the Rio Grande Valley at Hidalgo, Texas, but certainly to be expected in Tamaulipas.

Low shrub, the stems cinereous-tomentulose, becoming glabrate; leaves petiolate, ovate, 9 to 13 cm. long, obtusely acuminate, deeply cordate at base, crenate-dentate, finely stellate-pubescent above, paler and tomentulose beneath; flowers greenish, 2 mm. broad, in 2 or 3-flowered axillary umbelliform cymes; calyx 5-parted; petals clawed, the blade free at apex, not appendaged; capsule sessile, globose, 5-celled, muricate, the cells 1-seeded.

12. AYENIA L. Syst. Nat. ed. 10. 1247. 1759.

Shrubs or herbs; leaves serrate or dentate; flowers small, long-pedicellate, axillary, fasciculate or in cymes or umbels; calyx 5-lobate; petals 5, long-clawed, cucullate, the apex inflexed, adnate to the stamen tube, often with a dorsal gland; anthers 2 or 3-celled, solitary in the sinuses of the stamen tube; fruit a 5-celled capsule, separating into 5 1-seeded carpels, these bivalvate.

Fruit and ovary long-stipitate, the stipe slender, in fruit 2 to 3 mm. long or sometimes longer; calyx lobes not reflexed.
- Calyx 6 to 8 mm. long; leaves whitish-tomentose beneath ..... **1. A. ovata.**
- Calyx 2 to 4 mm. long; leaves never whitish-tomentose.
  - Capsule not muricate, glandular or covered with very short blunt tubercles.
    - Leaves narrowly lanceolate ..... **2. A. manzanilloana.**
    - Leaves ovate or broadly ovate ..... **3. A. wrightii.**
  - Capsule sharply muricate.
    - Blade of petals sagittate at base ..... **4. A. rotundifolia.**
    - Blade of petals not sagittate at base ..... **5. A. pusilla.**

Fruit and ovary neary sessile, the stipe stout, in fruit less than 1.5 mm. long.
- Leaves glabrous beneath or nearly so ..... **6. A. glabra.**
- Leaves densely stellate-pubescent beneath or tomentose.
  - Leaves small, 2 cm. long or less, rounded or obtuse at apex.
    - Leaves orbicular or rounded-obvoate, broadest at or above the middle. **7. A. fruticosa.**
    - Leaves ovate or rhombic-ovate, broadest near the base. **8. A. microphylla.**
  - Leaves large, mostly 5 to 10 cm. long, acute or acuminate.
    - Lower surface of the leaves covered with a fine close minute pale tomentum.
      - Sepals 5 mm. long ..... **9. A. paniculata.**
      - Sepals 2 to 2.5 mm. long ..... **10. A. magna.**

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[1] Thesaurus 401. 1651.

Lower surface of leaves stellate-tomentose, the hairs loose and spreading.
Sepals 5 to 7 mm. long ..... **11. A. berlandieri.**
Sepals 2.5 to 3 mm. long.
Upper leaves long-petiolate; leaves conspicuously cordate at base. **10. A. magna.**
Upper leaves nearly sessile; leaves rounded or subcordate at base.
Sepals green ..... **12. A. palmeri.**
Sepals brown-purple ..... **13. A. jaliscana.**

1. Ayenia ovata Hemsl. Diag. Pl. Mex. 4. 1878.
Ayenia mollis T. S. Brandeg. Univ. Calif. Publ. Bot. **3**: 385. 1909.
Hidalgo and Puebla; type from Zimapán, Hidalgo.
Shrub; leaves slender-petiolate, broadly ovate, acute, cordate at base, dentate, densely tomentose, 2.5 to 5 cm. long; flowers solitary or in pedunculate umbels, long-pedicellate; fruit about 1 cm. in diameter, covered with very long filiform hairy appendages.

2. Ayenia manzanilloana Rose, Contr. U. S. Nat. Herb. **1**: 309. 1895.
Known only from the type locality, Manzanillo, Colima.
Leaves short-petiolate, 2 to 5 cm. long, long-acuminate, rounded at base, serrate, green, glabrate; fruit 5 mm. in diameter, glabrate, covered with brown glands.

3. Ayenia wrightii Robinson, Bot. Gaz. **16**: 340. 1891.
Ayenia compacta Rose, Contr. U. S. Nat. Herb. **8**: 321. 1905.
Ayenia peninsularis T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 368. 1917.
Baja California and Sinaloa; type from head of Mazatlán River, Sinaloa.
Plants 30 to 60 cm. high, suffrutescent, slender, the branches pubescent; leaves slender-petiolate, 1 to 5 cm. long, acute or obtuse, finely pubescent or glabrate, serrate-dentate; fruit about 5 mm. in diameter.

4. Ayenia rotundifolia Hemsl. Diag. Pl. Mex. 4. 1878.
Known only from the type locality, Zimapán, Hidalgo.
Leaves slender-petiolate, ovate-rounded, 1 to 2.5 cm. wide, obtuse or retuse, sometimes cordate at base, crenate-dentate, soft-pubescent; sepals about 4 mm. long.

5. Ayenia pusilla L. Syst. Nat. ed. 10. 1247. 1759.
Ayenia filiformis S. Wats. Proc. Amer. Acad. **24**: 42. 1889.
Ayenia dentata T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 56. 1914.
? *Ayenia reflexa* T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 369. 1917.
Ayenia cuneata T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 369. 1917.
Nearly throughout Mexico. Widely distributed in the warmer parts of the Western Hemisphere.
Plants slender, essentially annual but often becoming suffrutescent; leaves very variable in form, lanceolate to suboricular, 1 to 5 cm. long, rounded to acuminate at apex, obtuse to cordate at base, dentate, pubescent or glabrous; fruit 5 to 6 mm. in diameter, pubescent or glabrate, covered with long or short spinelike processes.
The Mexican plants exhibit great variation in the shape and pubescence of the leaves, but the West Indian specimens are rather uniform. None of the segregates which have been described seem clearly differentiated from the mass of material from the West Indies and the southern United States generally referred to *A. pusilla*, and it has not appeared practicable to recognize any of them. The glands of the petals are so variable in size and form that they do not furnish a satisfactory basis for specific segregation.

6. **Ayenia glabra** S. Wats. Proc. Amer. Acad. **22**: 399. 1887.
Ayenia truncata Rose, Contr. U. S. Nat. Herb. **1**: 94. 1891.
Sonora and Sinaloa to Guerrero; type from Tequila, Jalisco.
Slender shrub, 1 to 4.5 meters high; leaves long-petiolate, lance-ovate to broadly ovate, 3.5 to 9 cm. long, acute to long-acuminate, subcordate at base, dentate; sepals green or purple-brown; capsule 8 mm. long, short-muricate.

7. **Ayenia fruticosa** Rose, Contr. U. S. Nat. Herb. **5**: 95. 1899.
Puebla; type from Tehuacán; probably also in Oaxaca.
Slender shrub; leaves short-petiolate, dentate, green above, densely and very finely whitish-tomentulose beneath; fruit 8 mm. in diameter, pubescent, muricate.

8. **Ayenia microphylla** A. Gray, Pl. Wright. **1**: 24. 1852.
Chihuahua and Coahuila. Western Texas and southern Arizona; type from El Paso.
Small, densely branched shrub, usually 30 cm. high or less; leaves short-petiolate, dentate, closely stellate-pubescent on both surfaces; capsule sparsely tuberculate.

9. **Ayenia paniculata** Rose, Contr. U. S. Nat. Herb. **1**: 94. 1891.
Known only from the type locality, Alamos, Sonora.
Shrub, about 60 cm. high; leaves long-petioled, rounded-ovate, 6 to 7 cm. long, acute or acuminate, rounded or subcordate at base, dentate, sometimes obscurely trilobate, green above, whitish beneath; flowers in a nearly naked, thyrsiform panicle; capsule 8 to 10 mm. in diameter, minutely stellate-tomentulose, tuberculate.

10. **Ayenia magna** L. Syst. Nat. ed. 10. 1247. 1759.
Ayenia purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. **7**: 328. 1920.
Veracruz and Yucatán. Jamaica and northern South America; type from Caracas, Venezuela.
Shrub, 0.5 to 2 meters high; leaves cordate, acute or acuminate, dentate, often pale beneath; capsule 6 to 9 mm. in diameter, strongly muricate.

11. **Ayenia berlandieri** S. Wats. Proc. Amer. Acad. **21**: 419. 1886.
Tamaulipas to Jalisco, Guerrero, and Morelos; type from Santander, Tamaulipas.
Plants suffrutescent, 1 to 2 meters high; leaves short-petiolate, ovate, acuminate, rounded or subcordate at base, denticulate, 3 to 7-nerved at base; sepals purple-brown, long-acuminate; capsule about 8 mm. in diameter, muricate.

12. **Ayenia palmeri** S. Wats. Proc. Amer. Acad. **21**: 419. 1886.
Known only from the type locality, Hacienda San Miguel, southwestern Chihuahua.
Shrub, about 1.5 meters high; leaves broadly ovate, short-petiolate, 4 to 6 cm. long, acute or acuminate, serrate; fruit 7 mm. in diameter, stellate-tomentulose, muricate.

13. **Ayenia jaliscana** S. Wats. Proc. Amer. Acad. **26**: 133. 1891.
Ayenia nelsoni Rose, Contr. U. S. Nat. Herb. **8**: 321. 1905.
Chihuahua to Jalisco and Chiapas; type from southwestern Chihuahua.
Shrub, 1 to 2 meters high; leaves broadly ovate, 5 to 9 cm. long, acuminate, serrate-dentate; capsule 7 to 9 mm. broad, short-muricate.

DOUBTFUL SPECIES.

AYENIA CORDIFOLIA DC. Prodr. 1: 488. 1824. Described from Mexico.

AYENIA MEXICANA Turcz. Bull. Soc. Nat. Moscou 36[1]: 569. 1863. *Cybiostigma sidaefolium* Turcz. Bull. Soc. Nat. Moscou 1852[2]: 156. 1852; *Ayenia sidaefolia* Hemsl. Biol. Centr. Amer. Bot. 1: 135. 1879, not *A. sidaefolia* DC. 1824.

AYENIA YUCATANENSIS Millsp. Field Mus. Bot. 1: 379. 1898. Type from Buenavista Xbac, Yucatán.

13. BUETTNERIA L. Syst. Nat. ed. 10. 939. 1759.

Scandent or procumbent shrubs, often armed with prickles; flowers small, pedicellate, mostly in lateral umbels or cymes; calyx 5-lobate; petals 5, cucullate, clawed, the limb bilobate, inflexed at apex, produced dorsally into a long ligule; anthers solitary in the sinuses of the stamen tube; fruit a 5-celled capsule, covered with long spines, the carpels easily separating, bivalvate, 1-seeded.

Stems armed with recurved prickles ..... **1. B. aculeata.**
Stems unarmed.
  Leaves entire ..... **2. B. catalpifolia.**
  Leaves dentate ..... **3. B. salicifolia.**

1. Buettneria aculeata Jacq. Stirp. Amer. 76. 1763.
Chaetaea aculeata Jacq. Enum. Pl. Carib. 17. 1760.
Buettneria carthagenensis Jacq. Stirp. Amer. Pict. 41. 1780.
Buettneria lanceolata DC. Prodr. 1: 487. 1824.
Buettneria tiliaefolia Presl, Rel. Haenk. 2: 144. 1836.
Buettneria lateralis Presl, Rel. Haenk. 2: 144. 1836.
Buettneria rubricaulis Presl, Rel. Haenk. 2: 145. 1836.

Sinaloa to San Luis Potosí, Yucatán, Tabasco, and Chiapas. Central America and northern South America; type from Cartagena, Colombia.

Scandent or procumbent shrub, the stems obtusely angulate, green, very prickly, glabrous or pubescent; leaves on long or short petioles, the upper ones lanceolate to broadly ovate, the lower ones broader, acute to long-acuminate, obtuse to cordate at base, usually crenate or serrate toward the apex, thin, green, glabrous or sparsely pubescent; flowers small, black-purple, in small axillary cymes; fruit body 7 to 10 mm. in diameter, covered with long stout spines. "Arrendador" (Sinaloa); "varilla prieta" (Michoacán, Guerrero); "zarza" (Tabasco, El Salvador); "xtexak" (Yucatán, Maya) "uña de gato" (Costa Rica); "zarza hueca" (Venezuela).

Reported by Sessé and Mociño[1] as *Byttneria scabra*. In Venezuela the root is employed as a substitute for sarsaparilla in the treatment of cutaneous and syphilitic diseases, and emmenagogue properties also are ascribed to it.

2. Buettneria catalpifolia Jacq. Pl. Hort. Schönbr. 1: *pl. 46*. 1797.

Michoacán to Oaxaca and Veracruz. Central America and northern South America; type from Caracas, Venezuela.

Large vine, the branches terete, tomentulose when young; leaves long-petiolate, ovate-cordate, 10 to 25 cm. long, cuspidate-acuminate, thin, green, glabrous and lustrous above, pubescent or glabrous beneath; inflorescence axillary or terminal, lax, pedunculate, the flowers white; calyx 5 to 6.5 mm. long; fruit body 2.5 to 3.5 cm. wide, usually depressed, covered with long slender prickles.

"Bejuco cenizo" (Michoacán, Guerrero).

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[1] Pl. Nov. Hisp. 39. 1887.

3. **Buettneria salicifolia** Presl, Rel. Haenk. **2**: 144. 1836.

Described from western Mexico; known to the writer only from the original description.

Branches terete, tomentose; leaves lanceolate, acute or short-acuminate, sharply dentate, glabrous above, tomentose beneath; flowers umbellate, 2 mm. long, the umbels axillary.

98. DILLENIACEAE. Dillenia Family.

Trees or shrubs, sometimes scandent; leaves alternate, simple, estipulate, commonly scabrous; flowers paniculate, terminal or axillary, usually perfect or polygamous; sepals 3 to 5, distinct or nearly so, strongly imbricate, persistent; stamens numerous, free, the anthers erect or versatile; fruit baccate, or usually of 1 to 5 dry carpels, these dehiscent on the inner or on the dorsal side; seeds usually arillate.

Anthers versatile; fruit baccate. Plants erect ---------- **1. SAURAUIA.**
Anthers erect; fruit 1 to 5 dry carpels.
  Inner 2 sepals much larger than the others, accrescent and inclosing the fruit. Plants scandent ---------- **2. DAVILLA.**
  Inner sepals similar to the others, not accrescent.
    Inflorescence chiefly terminal; plants scandent; aril lacerate. **3. TETRACERA.**
    Inflorescence wholly axillary; plants erect; aril not lacerate. **4. CURATELLA.**

1. **SAURAUIA** Willd. Ges. Naturf. Freund. Berlin Neue Schrift. **3**: 407. 1801.

Shrubs or small trees, usually with setose or paleaceous pubescence; leaves commonly serrulate, the lateral nerves numerous and parallel; flowers in axillary pedunculate panicles, commonly perfect; sepals 5; petals 5, connate at base or nearly free; stamens numerous, adherent to the base of the corolla, the anthers versatile; fruit baccate, 3 to 5-celled, the seeds small, embedded in pulp.

A monograph of the genus by Buscalioni has been in the course of publication in Malpighia (volumes 25 to 28) for several years.

The name "pipicho" is reported for one of the Oaxaca species. The fruit is said to be sweet and mucilaginous, and a syrup made from it is administered for chest affections.

Leaves setose-pilose benath, or sometims scabrous, with short simple hairs.
  Leaves densely setose-scabrous beneath ---------- **16. S. aspera.**
  Leaves setose-pilose beneath.
    Bracts of the inflorescence linear ---------- **1. S. conzattii.**
    Bracts oval ---------- **2. S. pseudopeduncularis.**
Leaves glabrate or stellate-pilose beneath.
  Leaves glabrate beneath.
    Leaves without tufts of hairs beneath in the axils of the lateral nerves. **3. S. leucocarpa.**
    Leaves with conspicuous tufts of whitish hairs beneath in the axils of the lateral nerves.
      Inflorescences short, 2.5 to 7 cm. long ---------- **4. S. barbigera.**
      Inflorescences elongate, mostly 10 to 20 cm. long.
        Leaf blades acute at base ---------- **5. S. serrata.**
        Leaf blades obtuse or rounded at base ---------- **6. S. reticulata.**
  Leaves stellate-pilose beneath, usually rather densely so.
    Leaves entire toward the base, crenate toward the apex, densely tomentose beneath ---------- **7. S. radlkoferi.**

Leaves serrulate.
Leaves without tufts of hairs beneath in the axils of the nerves; panicles nearly or quite as long as the leaves.
Leaves pale beneath, stellate-tomentose_____8. S. nelsoni.
Leaves green beneath, thinly stellate-pilose.
Hairs of the petioles mostly 3 to 4 mm. long; leaves mostly 8 to 14 cm. wide_____9. S. villosa.
Hairs of the petioles about 1 mm. long; leaves mostly 6 to 7 cm. wide_____10. S. scabrida.
Leaves with dense tufts of whitish hairs beneath in the axils of the nerves; panicles usually much shorter than the leaves.
Flowers 22 to 30 mm. broad.
Panicles 4 to 7 cm. long; flowers 25 to 30 mm. broad.
11. S. latipetala.
Panicles 10 to 15 cm. long; flowers about 22 mm. broad.
12. S. paucifiora.
Flowers 10 to 16 mm. broad.
Hairs of the petioles appressed_____13. S. pringlei.
Hairs of the petioles spreading.
Sepals glabrous on the outer surface, ciliate__14. S. willdemanni.
Sepals covered with short stellate setae_____15. S. buscalioniana.

1. **Saurauia conzattii** Buscalioni, Malpighia **25**: 403. *pl. 6, f. 9.* 1913.

Known only from the type locality, Cerro de la Raya, Cuyamecalco, Distrito de Cuicatlán, Oaxaca, altitude 2,800 meters.

Branchlets densely setose; leaves oblong-obovate, 12 to 18 cm. long, abruptly short-acuminate, cuneate at base, serrulate, green, yellowish-setose; panicles few-flowered, half as long as the leaves; flowers 2.3 to 2.5 cm. broad; sepals densely setose; stamens 10; ovary glabrous.

2. **Saurauia pseudopeduncularis** Buscalioni, Malpighia **26**: 30. *pl. 7, f. 13.* 1913.

Known only from the type locality, Sierra de San Pedro Nolasco, Oaxaca.

Branchlets setose; leaves short-petiolate, the petiole villous, the blade ovate-lanceolate or obovate, 12 to 19 cm. long, acute, at base acute or subobtuse, serrulate, yellowish-setose; panicles few-flowered, equaling or shorter than the leaves; flowers 1.2 to 1.5 cm. broad; sepals setose; stamens 25 to 30; ovary glabrous.

3. **Saurauia leucocarpa** Schlecht. Linnaea **10**: 249. 1836.

Saurauia angustifolia Turcz. Bull. Soc. Nat. Moscou **31**[1]: 242. 1858.

Michoacán and Guerrero to Veracruz and Oaxaca; type from Cuesta Grande de Chiconquiaco, Veracruz. Guatemala.

Tree, 5 to 6 meters high, the branchlets tuberculate-scabrous; leaves narrowly oblong-oblanceolate, 9 to 15 cm. long, acute, cuneate at base, obscurely serrulate, nearly glabrous; panicles equaling or shorter than the leaves; sepals usually glabrous.

4. **Saurauia barbigera** Hook. Icon. Pl. *pl. 331.* 1840.

Veracruz.

Shrub or small tree, 4.5 meters high, the branchlets appressed-setose; leaves oblong-oblanceolate, 4 to 11 cm. long, acute or acuminate, cuneate at base, serrate, sparsely setose above, green; panicles few-flowered, the flowers 12 mm. broad; sepals glabrous.

5. **Saurauia serrata** DC. Mém. Soc. Phys. Hist. Nat. Genève **1**: 420. *pl. 3.* 1822.

Saurauia pedunculata Hook. Icon. Pl. *pl. 331, 332.* 1840.

Saurauia pedunculata leucocarpa Buscalioni, Malpighia **28**: 237. 1917.

Michoacán to Veracruz and Oaxaca.

Shrub or small tree, the branchlets sparsely appressed-setose; leaves short-petiolate, cuneate-obovate, 10 to 20 cm. long, acute or obtuse, serrulate, glabrate; panicles equaling or shorter than the leaves; flowers about 18 mm. broad; sepals whitish-pulverulent. "Mameyito," "mameyito blanco" (Oaxaca).

6. **Saurauia reticulata** Rose, Contr. U. S. Nat. Herb. **8**: 52. 1903.

Known only from the type locality, canyon near Cuernavaca, Morelos, altitude 1,950 meters.

Branchlets glabrate; leaves short-petiolate, oblong-oblanceolate, 13 to 24 cm. long, subacute, serrulate, thick, glabrate; panicles 11 to 16 cm. long, many-flowered, the flowers about 2 cm. wide; sepals setulose-scabrous.

A similar plant from Sinaloa, known only from imperfect material, is said to bear the vernacular name "almendrillo."

7. **Saurauia radlkoferi** Buscalioni, Malpighia **27**: 6. *pl. 7, f. 14*. 1915.

Described from somewhere in Mexico.

Branchlets setose; leaves lance-ovate or obovate, 9 to 19 cm. long, obtuse at base and apex, sparsely pilose above, smooth, fulvous-tomentose beneath; panicles shorter than the leaves, many-flowered; sepals puberulent and setulose.

8. **Saurauia nelsoni** Rose, Contr. U. S. Nat. Herb. **8**: 52. 1903.

Oaxaca and Chiapas; type collected near Totontepec, Oaxaca. Guatemala.

Shrub; leaves oblong-obovate or elliptic-obovate, 14 to 25 cm. long, rounded at base and apex, scaberulous above, densely stellate-pilosulous beneath; panicles many-flowered, as long as the leaves; flowers about 12 mm. broad; sepals densely setose-paleaceous; petals pink.

9. **Saurauia villosa** DC. Mém. Soc. Phys. Hist. Nat. Genève **1**: 420. 1822.

Obelanthera melastomacea Turcz. Bull. Soc. Nat. Moscou **20**[1]: 149. 1847.
Saurauia macrophylla Linden; Lindl. & Paxt. Fl. Gard. **2**: 27. 1852.
Saurauia obelanthera Turcz. Bull. Soc. Nat. Moscou **31**[1]: 245. 1858.
Saurauia villosa hahni Buscalioni, Malpighia **26**: 305. 1913.
Saurauia villosa macrantha Buscalioni, Malpighia **26**: 310. 1913.
Saurauia villosa tuberculata Buscalioni, Malpighia **26**: 312. 1913.
Saurauia villosa scabrida Buscalioni, Malpighia **26**: 390. 1914.

Veracruz and Chiapas. Guatemala.

Shrub or small tree, 2 to 6 meters high; leaves oval to cuneate-obovate, 15 to 35 cm. long, acute or obtuse, rounded or rarely acute at base; panicles large and many-flowered, long-pedunculate, the flowers about 1 cm. broad; sepals densely setose; stamens 20 to 30.

10. **Saurauia scabrida** Hemsl. Diag. Pl. Mex. 3. 1878.

Saurauia scabrida hemsleyana Buscalioni, Malpighia **26**: 409. 1914.

Veracruz; type from Valley of Córdoba.

Leaves lance-elliptic, 20 to 30 cm. long, acute, cuneate at base, coarsely dentate; panicles few-flowered, equaling or shorter than the leaves; petals 6 to 8 mm. long; sepals setose-paleaceous; fruit globose, 8 mm. in diameter.

11. **Saurauia latipetala** Hemsl. Diag. Pl. Mex. 4. 1878.

Chiapas (type locality). Guatemala.

Branchlets setulose; leaves lanceolate or oblanceolate, 7 to 17 cm. long, acute or acutish, obtuse at base, serrulate, thin; panicles 4 to 7 cm. long, few-flowered, the flowers 2.5 to 3 cm. wide; sepals pulverulent and sparsely setulose outside; stamens 30 to 35.

12. Saurauia pauciflora Rose, Contr. U. S. Nat. Herb. **8**: 52. 1903.

Saurauia pauciflora ghiesebrechti Buscalioni, Malpighia **26**: 291. 1913.

Chiapas; type from San Cristóbal, altitude 2,100 to 2,640 meters.

Shrub, the young branches densely setose with subappressed hairs; leaves short-petiolate, oblong-oblanceolate, 7 to 10 cm. long, acuminate, acute or obtuse at base, very rough; panicles 10 to 15 cm. long, few-flowered; flowers 22 mm. broad; sepals densely setose; stamens about 20.

13. Saurauia pringlei Rose, Contr. U. S. Nat. Herb. **8**: 52. *pl. 12*. 1903.

Saurauia pringlei micrantha Buscalioni, Malpighia **26**: 137. 1913.

Guerrero and Oaxaca; type from Sierra de San Felipe, Oaxaca, altitude 2,550 meters. Guatemala.

Shrub or small tree, 2 to 3 meters high or larger, the branchlets appressed-setose; leaves oblong-oblanceolate, 10 to 25 cm. long, acute or short-acuminate, acute or obtuse at base, serrulate; panicles 9 to 13 cm. long, many-flowered; flowers 15 mm. broad; sepals pulverulent; stamens 20 to 25.

14. Saurauia willdemanni Buscalioni, Malpighia **26**: 143. 1913.

Oaxaca; type from Juquila.

Branchlets setose; leaves obovate or lance-oval, 7 to 14 cm. long, acute or acuminate, acute at base, rough, serrulate; panicles half as long as the leaves, few-flowered; stamens 20.

15. Saurauia buscalioniana Blake, Contr. Gray Herb. n. ser. **52**: 74. 1917.

Type from the Sierra Madre of Michoacán or Guerrero, altitude 1,800 meters; perhaps also in Chiapas.

Tree, 5 to 6 meters high, the branchlets densely setose-pilose; leaves oblanceolate-oblong, 18 to 22 cm. long, acute or short-acuminate, cuneate at base; panicles 9 to 12 cm. long, many-flowered; flowers about 12 mm. broad; stamens about 30.

16. Saurauia aspera Turcz. Bull. Soc. Nat. Moscou **31**[1]: 242. 1858.

Known only from Oaxaca, the type locality.

Branchlets appressed-setulose; leaves broadly oblong-obovate, 10 to 20 cm. long, acute or short-acuminate, obtuse at base, serrulate, very scabrous; panicles nearly as long as the leaves, many-flowered; sepals densely setose-paleaceous; flowers white.

DOUBTFUL SPECIES.

SAURAUIA ANISOPODA Turcz. Bull. Soc. Nat. Moscou **31**[1]: 242. 1852. Type from Oaxaca.

2. DAVILLA Vand.; Roem. Script. Pl. 115. 1796.

1. Davilla kunthii St. Hil. Pl. Usuel. Bras. 6. 1824–28.

Davilla lucida Presl, Rel. Haenk. **2**: 73. 1836.

Davilla ovata Presl, Rel. Haenk. **2**: 73. 1836.

Veracruz, Tabasco, and Oaxaca. Central and South America.

Scandent shrub; leaves petiolate, oblong-elliptic to nearly orbicular, 6 to 18 cm. long, rounded at base and apex, or sometimes acute at apex, coriaceous, serrulate or nearly entire, scabrous above and often lustrous, densely short-pilose beneath; panicles large, chiefly terminal, the flowers yellow; sepals 5, the outer ones small, the 2 inner ones accrescent, inclosing the fruit, 7 to 10 mm. long, pilose; petals about as long as the inner sepals; carpel 1, bivalvate, the seed surrounded by a thin aril. "Bejuco de tachicón" (Tabasco); "chumico de bejuco" (Costa Rica, Panama); "bejuco chaparrón" (Guatemala, Honduras); "bejuco tomé" (Colombia); "chumisquillo" (Panama).

The tough stems are sometimes used in the construction of huts, for tying the larger timbers of the framework. The leaves are employed as a substitute for sandpaper.

The seeds of *Davilla rugosa* Poir, which is known in Nicaragua as "hoja-chigüe" and in Cuba as "bejuco castaño" are said to have violent and dangerous emetic-cathartic properties. The bark of one of the Brazilian species is reported to yield a black dye.

3. TETRACERA L. Sp. Pl. 533. 1753.

Scandent shrubs; leaves with numerous parallel lateral nerves; flowers paniculate, the panicles terminal or in the upper axils; sepals 4 to 6, spreading, the petals of the same number; fruit of 1 to 5 carpels, the ovules numerous but the seeds 1 to 5, surrounded by a thin aril.

The name "bejuco de agua" frequently applied to these plants is derived from the fact that the stems, when cut, yield a large amount of clear water. They are often a satisfactory source of water to travelers in the dry tropical forests when surface water is absent.

Fruit of 3 to 5 carpels; sepals sericeous within ..... **1. T. volubilis.**
Fruit of a single carpel; sepals glabrous within ..... **2. T. sessiliflora.**

1. Tetracera volubilis L. Sp. Pl. 533. 1753.

Tetracera erecta Sessé & Moc.; DC. Reg. Veg. Syst. **1**: 404. 1818.

Tetracera alata Presl, Rel. Haenk. **2**: 71. 1836.

? *Tetracera salicifolia* Presl, Rel. Haenk. **2**: 71. 1836.

Veracruz and Oaxaca, and probably elsewhere. West Indies, Central America, and South America.

Large vine; leaves short-petiolate, obovate-oblong or obovate, 7 to 18 cm. long, rounded or short-pointed at apex, decurrent at base, serrulate or nearly entire, coriaceous, very scabrous; panicles usually large; sepals rounded, unequal, 3 to 5 mm. long; carpels 7 to 10 mm. long, short-beaked, sparsely hairy at the apex. "Hoja-chigüe" (Nicaragua); "raspa," "raspa-guacales" (Costa Rica); "bejuco chaparro," "bejuco tomé" (Colombia); "bejuco guará," "bejuco carey" (Cuba).

The seeds and leaves are used in domestic medicine, sudorific, antisyphilitic, febrifuge, and diuretic properties being attributed to them.

2. Tetracera sessiliflora Triana & Planch. Ann. Sci. Nat. IV. **17**: 21. 1862.

Delima mexicana Sessé & Moc.; DC. Reg. Veg. Syst. **1**: 407. 1818. Not (?) *Tetracera mexicana* Eichl. 1863.

Delima dioica Sessé & Moc. Pl. Nov. Hisp. 89. 1887.

Tepic to Guerrero. Central America and Colombia; type from Colombia.

Large vine; leaves short-petiolate, oblong, oblanceolate-oblong, or obovate, 6 to 20 cm. long, rounded or obtuse at apex, decurrent at base, remotely dentate, very scabrous; panicles large and many-flowered; flowers white; sepals rounded, densely pubescent; carpels 6 to 8 mm. long, lustrous; wood very porous, pale brownish pink, coarse-grained, soft. "Bejuco de agua" (Michoacán, Guerrero).

The flowers are sweet-scented. The stems are often used as a substitute for rope, and the rough leaves for polishing wood.

DOUBTFUL SPECIES.

TETRACERA MEXICANA Eichl. in Mart. Fl. Bras. **13**[1]: 87. 1863. Based upon a specimen from "Onitaco," Mexico. No proper description of the plant has been

published. According to Gilg,[1] the sepals are glabrous outside, while in the two species listed above the sepals are hairy on the outer face.

4. CURATELLA L. Syst. Nat. ed. 10. 1079. 1759.

1. **Curatella americana** L. Syst. Nat. ed. 10. 1079. 1759.

Tepic to Chiapas. Cuba and Central and South America.

Shrub or small tree, 3 to 6 meters high, the trunk usually crooked, the bark scaly, brownish; leaves short-petiolate, oval or elliptic-ovate, 12 to 30 cm. long or larger, emarginate, abruptly short-decurrent at base, coriaceous, very rough on both surfaces, the margin somewhat sinuate, the lateral nerves numerous, parallel, extending to the margin; flowers white, ill-scented, in short dense lateral panicles; sepals 4 or 5, spreading; petals 4 or 5, 5 to 6 mm. long; carpels 2, hirsute, 6 to 7 mm. long; seeds black, surrounded by a thin aril; wood rather soft, light, coarse-grained, taking a poor polish, its specific gravity reported as 0.805, the sapwood thin, light brown, the heartwood somewhat darker. "Raspa-viejo" (Michoacán, Guerrero); "tlachicón" (Oaxaca; from the Nahuatl *tla-chiquoni*, "thing that makes rough," *Reko*); "hoja man" (Oaxaca, *Seler*); "chumico de palo," "hoja-chigüe," "raspa-guacal" (Costa Rica); "chaparro" (Colombia, Venezuela, Guatemala, Honduras); "chumico," "chumico palo," "curatela" (Panama); "vaca-buey," "careicillo" (Cuba); "peralejo" (Colombia).

Seler states that in Oaxaca the ground seeds are mixed with chocolate to flavor it. The rough leaves, which contain silicon, are widely used as a substitute for sandpaper for polishing wood and metal, and for cleaning kitchen utensils. The wood is of little value. The bark is said to be rich in tannin and to be used in Brazil for tanning skins. A decoction of the leaves is employed in Brazil for treating wounds. In some parts of western Mexico the tree is abundant and forms dense thickets or low forests.

99. OCHNACEAE. Ochna Family.

1. OURATEA Aubl. Pl. Guian. 1: 397. 1775.

Glabrous trees or shrubs; leaves alternate, persistent, coriaceous, lustrous, serrulate or entire, stipulate; flowers yellow, in terminal or lateral racemes or panicles, the pedicels jointed at base; sepals 5, imbricate, thin; petals 5, obovate, clawed; stamens 10, the anthers dehiscent by pores; ovary 5-parted; fruit of 5, or by abortion fewer, sessile 1-seeded drupes.

Leaves 10 to 16 cm. long, bright green, the veinlets mostly parallel, not reticulate ..... **1. O. mexicana.**
Leaves 4 to 9 cm. long, pale, the veinlets not parallel, irregularly reticulate. **2. O. pallida.**

1. **Ouratea mexicana** (Humb. & Bonpl.) Engl. in Mart. Fl. Bras. **12**[2]: 312. 1876.

Gomphia mexicana Humb. & Bonpl. Pl. Aequin. **2**: 21. *pl. 74.* 1809.

? *Gomphia jurgensenii* Planch. Lond. Journ. Bot. **6**: 11. 1847.

? *Ouratea jurgensenii* Engl. in Mart. Fl. Bras. **12**[2]: 351. 1876.

Michoacán to Oaxaca; type collected between Acapulco and Chilpancingo, Guerrero. Central America.

Shrub or tree, 2 to 5 meters high; leaves short-petiolate, narrowly elliptic-oblong or oblong-oblanceolate, 2.5 to 4.5 cm. wide, acute or short-acuminate, acute to rounded at base, spinulose-serrulate toward the apex, lustrous; panicles 5 to 16 cm. long, many-flowered, the flowers pedicellate; sepals 5 to 7 mm.

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[1] In Engl. & Prantl, Pflanzenfam. **3**[6]: 111. 1893.

long, obtuse; petals slightly longer than the sepals. "Cinco negritos," "zapotillo de la costa" (Oaxaca).

2. **Ouratea pallida** Standl., sp. nov.

Sinaloa to Guerrero; type from Acaponeta, Tepic (*Rose, Standley & Russell* 14445; U. S. Nat. Herb. no. 637331).

Shrub or small tree, 2 to 4.5 meters high, with divaricate branchlets; petioles 2 to 5 mm. long; leaf blades oblong, lanceolate, ovate, oblong-obovate, or elliptic-oblong, acute or obtuse, acutish to rounded at base, finely serrulate throughout or subentire, coriaceous, pale green, the venation prominulous beneath; flowers in dense racemes or panicles 4 cm. long or shorter, the pedicels about as long as the ovoid buds; sepals 7 mm. long, obtuse; petals 8 to 9 mm. long; anthers 4 mm. long; carpels ellipsoid, 1 cm. long, very lustrous.

The shrub is common in dry places along the coastal plain of Sinaloa and Tepic.

100. MARCGRAVIACEAE. Marcgravia Family.

Epiphytic or scandent shrubs; leaves alternate, leathery, simple or entire, often dimorphous; inflorescence racemose, terminal, pendulous; bracts borne in the midst of the raceme or upon the pedicels, greatly modified, nectariferous; flowers perfect; sepals 5, imbricate; petals 5, connate at base, or throughout and forming a caplike mass; stamens 5 to 40; fruit globose, coriaceous or fleshy, indehiscent, 5 to many-celled.

Central (terminal) flowers sterile; petals united to form a caducous caplike corolla ..... 1. **MARCGRAVIA.**

Central or terminal flowers, as well as the others, fertile; petals nearly distinct. 2. **SOUROUBEA.**

1. MARCGRAVIA L. Sp. Pl. 503. 1753.

1. **Marcgravia mexicana** Gilg, Bot. Jahrb. Engler **25**: Beibl. **60**: 26. 1898.

Veracruz and perhaps elsewhere; type from Mirador, Veracruz.

Glabrous shrub, epiphytic and more or less scandent; leaves of fertile branches lanceolate, 6 to 10.5 cm. long, nearly sessile, acuminate, acute or obtuse at base; inflorescence umbel-like, the pedicels 3 to 5 cm. long, the apex of the rachis bearing several nectaries, these tubular, 7 to 8 mm. long, stalked; sepals 4, orbicular, 2 mm. long; corolla cylindric.

The genus is represented by a large number of species in the humid forests of tropical America. The nectaries are usually bright-colored. They hang inverted and are filled with nectar, which is much sought by humming-birds and insects. The young sterile shoots are very slender and vinelike, and their leaves are decidedly different from those of the fertile branches. In sterile specimens which probably belong to *M. mexicana* the leaves are sessile, oblong or ovate, and only 1 to 3 cm. long. Specimens of these sterile branches were reported from Mexico by Liebmann[1] as *Urostigma scandens*, he believing that he was dealing with one of the wild figs (*Ficus*).

Imperfect Oaxaca specimens evidently represent a second species of the genus for Mexico, but the material is insufficient for identification or description. The Oaxaca plant is known locally as "gallitos."

2. SOUROUBEA Aubl. Pl. Guian. 1: 244. 1775.

1. **Souroubea exauriculata** Delp. Att. Soc. Ital. Sci. Nat. Milan. **12**: 180. 1869.

Veracruz and Oaxaca.

Leaves short-petiolate, oblong-oblanceolate, 7 to 14 cm. long, 3 to 5 cm. wide, acute or obtuse, acute at base, thick, glabrous; racemes 10 to 15 cm. long or

[1] Dansk. Vid. Selsk. Skrivt. V. 2: 330. 1851.

larger, puberulent, the pedicels stout, about 1 cm. long; bract borne at the apex of the pedicel, helmet-shaped, about 1 cm. long; sepals rounded, 3 to 4 mm. long; petals oval, about 7 mm. long, obtuse.

101. THEACEAE. Tea Family.

Trees or shrubs; leaves alternate, evergreen, simple; peduncles 1-flowered, axillary or lateral, solitary or fasciculate; flowers perfect; sepals 5, imbricate, free or slightly united at base; petals 5, imbricate, united at base or free; stamens numerous, the anthers erect; fruit indehiscent, 2 to 5-celled, globose or ovoid.

The best-known member of the family is the tea plant, *Thea sinensis* L., a native of China and India.

The loblolly bay, *Gordonia lasianthus* (L.) Ellis, a native of the southeastern United States, has been reported from Tepic, by Hemsley. No similar plant has been seen in the Mexican collections examined by the writer.

Seeds and ovules attached at the apex of the cell; sepals not ciliate, sometimes glandular-denticulate ---------- 1. **TAONABO.**
Seeds and ovules attached at the side of the cell; sepals ciliate ---- 2. **EURYA.**

1. TAONABO Aubl. Pl. Guian. 569. 1775.

Evergreen glabrous trees or shrubs; leaves coriaceous, entire or serrulate, short-petiolate; penduncles axillary or lateral, 1-flowered, recurved, solitary or fasciculate, bibracteolate; sepals 5; petals 5, white, connate at base; stamens numerous; fruit indehiscent, globose or ovoid, 2 or 3-celled, tipped with the persistent style.

The species are closely related and it is doubtful whether all those listed below, or even any large proportion of them, deserve recognition as species. The names "hierba del cura" and "tepezapote" (from the Nahuatl *tepezapotl*, "mountain zapote") are applied to the various species, and the name "limoncillo" is reported from Hidalgo. A decoction of the leaves is used to bathe parts of the body affected with rheumatism.

Bractlets inserted somewhat below the base of the sepals, usually oblong or deltoid-oblong, after anthesis deciduous or becoming remote from the calyx.
- Leaves mostly 2 to 3 cm. wide; sepals in fruit 7 to 10 mm. long. **1. T. pringlei.**
- Leaves 3 to 5.5 cm. wide; sepals 10 to 12 mm. long -------- **2. T. maltbyana.**

Bractlets inserted at the base of the sepals, broadly ovate to orbicular, persistent at the base of the calyx.
- Flowers short-pedicellate, the pedicels scarcely or not at all longer than the flower or fruit ---------- **3. T. sylvatica.**
- Flowers long-pedicellate, the pedicels usually much longer than the flower or fruit.
  - Leaves crenate-serrulate ---------- **4. T. tepezapote.**
  - Leaves entire.
    - Fruit and ovary rounded at apex, abruptly contracted into the style. **5. T. sphaerocarpa.**
    - Fruit and ovary acute at apex, gradually narrowed into the style. **6. T. oocarpa.**

1. **Taonabo pringlei** Rose, Contr. U. S. Nat. Herb. 8: 322. 1905.

Mountains of Michoacán and Morelos; type from Sierra de Tepoztlán, Morelos, altitude 2,250 meters.

Small tree; leaves narrowly oblong-oblanceolate, 4.5 to 10 cm. long, obtuse or rounded at apex, attenuate at base, obscurely serrulate, paler beneath; pedicels

equaling or longer than the flowers; sepals about 1 cm. long, entire; ovary acute.

Ternstroemia chalicophila Loesener,[1] described from Huitztan, Chiapas, is probably a synonym of this species.

2. **Taonabo maltbyana** Rose, Contr. U. S. Nat. Herb. **8**: 322. 1905.[2]

Ternstroemia maltbyana Rose, U. S. Dept. Agr. N. Amer. Fauna **14**: 78. 1899.

Sinaloa and the Tres Marías Islands; type from María Madre Island, Tepic.

Leaves oblong-obovate or obovate-elliptic, 5.5 to 11 cm. long, rounded or very obtuse at apex, acute at base, entire; pedicels slender, often 5 cm. long; sepals about 1 cm. long, entire; fruit subglobose, 1.5 cm. thick.

3. **Taonabo sylvatica** (Schlecht. & Cham.) Szysz. in Engl. & Prantl, Pflanzenfam. 3^6: 189. 1893.

Ternstroemia sylvatica Schlecht. & Cham. Linnaea **5**: 220. 1830.

Veracruz and Hidalgo; type collected between Jalapa and San Andrés, Veracruz.

Small tree, 3 to 4.5 meters high; leaves slender-petiolate, oblanceolate or oblong-obovate, 4.5 to 8 cm. long, acute or acuminate at base and apex, thin, entire; sepals 5 to 7 mm. long, entire or obscurely glandular-denticulate; fruit ovoid, about 1.7 cm. long and 1 cm. thick. "Hierba del cura" (Veracruz).

4. **Taonabo tepezapote** (Schlecht. & Cham.) Szysz. in Engl. & Prantl, Pflanzenfam. 3^6: 189. 1893.

Ternstroemia tepezapote Schlecht. & Cham. Linnaea **6**: 420. 1831.

Veracruz and Oaxaca; type from Tecolutla, Veracruz.

Small tree; leaves oblong-oblanceolate to obovate, 5 to 11 cm. long, 2 to 4.5 cm. wide, obtuse or acutish at apex, rarely rounded, acute at base, paler beneath; sepals about 7 mm. long, usually entire; ovary acute. "Tepezapote" (Veracruz).

5. **Taonabo sphaerocarpa** Rose, Contr. U. S. Nat. Herb. **8**: 322. 1905.

Guerrero to Chiapas; type from Valley of Cuicatlán, Oaxaca. Guatemala.

Leaves obovate or oblong-obovate, 7 to 11 cm. long, 3 to 5.5 cm. wide, rounded or obtuse at apex, acute at base, thick, pale beneath; sepals 7 to 9 mm. long, often glandular-denticulate; fruit subglobose, sometimes nearly 3 cm. in diameter.

6. **Taonabo oocarpa** Rose, Contr. U. S. Nat. Herb. **8**: 322. 1905.

Oaxaca; type from Ocuilapa, altitude 1,020 to 1,140 meters.

Leaves obovate or oblong-obovate, 7 to 9 cm. long, 2.5 to 3.8 cm. wide, obtuse or acutish, acute at base, thick, pale beneath; sepals nearly 1 cm. long, glandular-denticulate; fruit about 1.5 cm. long, 1.5 cm. thick at base.

DOUBTFUL SPECIES.

TAONABO LINEATA (DC.) Rose, Contr. U. S. Nat. Herb. **8**: 322. 1905. *Ternstroemia lineata* DC. Mém. Soc. Phys. Hist. Nat. Genève **1**: 409. 1822. Type from Chalma, Veracruz. Reported by Sessé and Mociño[3] as *Ternstroemia meridionalis*.

2. EURYA Thunb. Nov. Gen. Pl. 67. 1783.

Shrubs or trees; leaves thick, persistent; flowers small, the peduncles 1-flowered, solitary or fasciculate, bibracteolate; sepals 5; petals 5, distinct or nearly so, white; fruit indehiscent, 2 to 5-celled; the seeds few in each cell.

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[1] Bull. Herb. Boiss. II. **3**: 213. 1903.

[2] The specific name is given incorrectly here as "*maltbyi*."

[3] Pl. Nov. Hisp. 86. 1887.

Leaves entire.....1. **E. mexicana.**
Leaves serrulate.....2. **E. theoides.**

1. **Eurya mexicana** (Turcz.) Syzsz. in Engl. & Prantl, Pflanzenfam. 3[6]: 189. 1893.

Freziera integrifolia Benth. Pl. Hartw. 6. 1839. Not *Eurya integrifolia* Blume, 1856.

Tristylium mexicanum Turcz. Bull. Soc. Nat. Moscou 31[1]: 248. 1858.

Cleyera integrifolia Planch.; Hemsl. Biol. Centr. Amer. 1: 93. 1879.

Cleyera mexicana Planch.; Hemsl. Biol. Centr. Amer. Bot. 1: 93. 1879.

Ternstroemia purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 187. 1915.

Michoacán to Chiapas and Morelos; type from Sierra San Pedro Nolasco, Oaxaca.

Small tree; leaves elliptic or elliptic-oblong, 4.5 to 13 cm. long, acute or short-acuminate, obtuse or acute at base, lustrous, paler beneath; pedicels much longer than the flowers; sepals suborbicular, 3 to 4 mm. long, ciliate; fruit ovoid-globose, 8 to 10 mm. long.

2. **Eurya theoides** (Swartz) Blume, Mus. Bot. Lugd. Bat. 2: 105. 1856.

Eroteum theoides Swartz, Prodr. Veg. Ind. Occ. 85. 1788.

Freziera theoides Swartz, Fl. Ind. Occ. 2: 972. 1800.

Veracruz, Oaxaca, and Chiapas. West Indies and Central America.

Shrub or small tree; leaves obovate-elliptic or elliptic-oblong, 4 to 13 cm. long, acute or acuminate, acute or acutish at base, paler beneath, coriaceous, yellowish green when dry; sepals 3 to 4 mm. long, ciliate, sericeous outside or glabrate; fruit globose-ovoid, 6 to 7 mm. long. "Tito" (Costa Rica).

102. HYPERICACEAE. St. John's-wort Family.

Shrubs or trees; leave opposite, entire, usually gland-dotted, herbaceous, estipulate; flowers perfect, terminal, cymose or paniculate, sometimes solitary; sepals 5 or 4, imbricate; petals 5 or 4; stamens numerous; fruit baccate or capsular, 3 to 5-celled.

Besides the genera listed below, the genus *Hypericum* is represented in Mexico by a large number of species, all of which are herbs.

Fruit capsular; petals 4, glabrous; sepals very unequal.....1. **ASCYRUM.**
Fruit baccate; petals 5, villous within; sepals equal or nearly so...2. **VISMIA.**

1. ASCYRUM L. Sp. Pl. 787. 1753.

1. **Ascyrum hypericoides** L. Sp. Pl. 788. 1753.

Ascyrum crux-andreae L. Sp. Pl. ed. 2. 1107. 1763.

Veracruz, Oaxaca, and Chiapas. Guatemala, West Indies, and United States.

Glabrous shrub, usually less than 30 cm. high, much branched, the branches compressed; leaves obovate to nearly linear, 8 to 25 mm. long, obtuse, dotted with black glands; flowers terminal and axillary, pedicellate, 12 to 18 mm. broad, yellow; outer sepals oval or ovate, 8 to 12 mm. long, green, the inner narrow and shorter; stamens numerous; capsule ovoid, 4 mm. long, 1-celled. "Arrayanilla" (Porto Rico).

A decoction of the leaves is sometimes employed as a resolutive and astringent. Purgative properties are ascribed to the seeds.

2. VISMIA Vand. Fl. Lusit. & Bras. 51. 1788.

Other species besides the following occur in Central America.

1. **Vismia mexicana** Schlecht. Linnaea **10**: 245. 1828.

Veracruz and Oaxaca; type from Hacienda de la Laguna, Veracruz. Central America.

Small tree with pyramidal crown; leaves slender-petiolate, lanceolate or lance-ovate, 8 to 18 cm. long, acute or acuminate, rounded to subacute at base, entire, very finely whitish or brownish-tomentulose beneath, glabrous above; flowers in terminal panicled cymes, pedicellate; sepals 5, equal, 6 to 7 mm. long; petals 5, 7 mm. long, black-lineate, villous within; stamens numerous, in 5 clusters; fruit baccate, globose-ovoid, 1.5 cm. long, 5-celled, containing many seeds.

Vismia ferruginea H. B. K. is known in Guatemala as "achiotillo" and "camparaguey."

103. CLUSIACEAE. Clusia Family.

Trees or shrubs, sometimes epiphytic, with resinous, usually yellow juice; leaves opposite, entire, coriaceous, pinnate-nerved, estipulate; flowers usually dioecious or polygamous, axillary or terminal, white, yellow, or pink; sepals 2 to 6, imbricate, decussate; petals usually 2 to 4; stamens numerous in the staminate flower; fruit capsular, baccate, or drupaceous.

Flowers terminal; fruit capsular but usually fleshy ..... **1. CLUSIA.**
Flowers axillary; fruit baccate or drupaceous.
  Peduncles several-flowered, the flowers racemose ..... **2. CALOPHYLLUM.**
  Peduncles 1-flowered.
    Style elongate; calyx closed before anthesis ..... **3 MAMMEA.**
    Style very short or none; calyx of imbricate sepals ..... **4 RHEEDIA.**

1. CLUSIA L. Sp. Pl. 509. 1753.

Glabrous trees or shrubs, often epiphytic, with resinous juice; leaves coriaceous, with numerous slender lateral nerves; flowers terminal, small or large, dioecious or polygamous; sepals 4 to 6, orbicular; petals 4 to 9, oblong or obovate; stamens numerous in the staminate flower; ovary 5 to 12-celled; fruit capsular, coriaceous or fleshy, septicidally dehiscent; seeds usually numerous, arillate.

Leaves rounded-obovate, less than one and one-half times as long as broad, very thick ..... **1. C. rosea.**
Leaves oblanceolate to oval-obovate, usually fully twice as long as broad, thinner.
  Petioles about 5 cm. long ..... **2. C. ovigera.**
  Petioles 0.5 to 3 cm. long.
    Staminate flowers 3.5 to 4 cm. broad ..... **3. C. orizabae.**
    Staminate flowers less than 3 cm. broad.
      Petioles very stout, marginate to base; leaves broadly rounded at apex. **4. C. salvinii.**
      Petioles comparatively slender, not marginate; leaves rounded to acute at apex.
        Leaves rounded at apex.
          Fruit about 12-celled; leaves mostly 8 to 10 cm ..... **5. C. flava.**
          Fruit about 7-celled; leaves mostly 5 to 6 cm. long. **6. C. parvicapsula.**
        Leaves, at least most of them, acute or obtuse ..... **7. C. mexicana.**

1. Clusia rosea Jacq. Enum. Pl. Carib. 34. 1760.

Chiapas. Central America, West Indies, and northern South America.

Shrub or tree, 3 to 10 meters high, usually epiphytic when young and destroying the host plant in age; leaves short-petiolate, 7 to 15 cm. long and nearly as wide, broadly rounded at apex, rounded or cuneate at base, very thick, with numerous close parallel lateral nerves; flowers polygamous; petals 6, white or tinged with pink; fruit 8 to 12-celled, 5 to 6 cm. in diameter. "Cupey" (Porto Rico, Panama); "copey" (Cuba).

The wood is said to be reddish and to have a specific gravity of 0.876. An infusion of the leaves is sometimes employed for chest affections and a decoction of the bark (in Venezuela) as a lotion for rheumatism. A gum or resin obtained from the fruit was used by the South American Indians as a resolutive in treating fractures and dislocation.

Oviedo (Lib. VIII, Cap. XIV) gives the following account of a tree which must be *Clusia rosea* or some closely related species: "The *copey* is a fine tree with good wood, and it has leaves such as I have described above for the *guiabara* or *uvero*. But the *copey* is a much larger tree, with smaller leaves, and the leaves are twice as thick or more, and better for writing on with a pin or a sharp point; the veins of the leaves are more delicate and hinder writing less than those of the *uvero*. In the early times of the conquest of Hispaniola and other islands, the Christians made playing-cards of *copey* leaves, and lost or gained much money with them, for lack of better ones; on the leaves they drew the kings, knights, knaves, and spots, and all the other figures and values that there usually are on cards, just as I have painted here the five of diamonds (plate 3, figure 6). As these leaves are very thick they held the drawings well, and shuffling did not break them. The fruit of this tree I have not seen, although I have often seen the leaves and the trees themselves."

For an illustration of *Clusia rosea* see Contr. U. S. Nat. Herb. **8**: *pl. 28.*

2. Clusia ovigera Triana & Planch. Ann. Sci. Nat. IV. **13**: 354. 1860.

Known only from the type collection, from somewhere in southern Mexico.

Leaves obovate-oblong, 15 to 20 cm. long, obtuse or obtuse-acuminate, acute at base, coriaceous; cymes with 3 or more long-pedicellate flowers; sepals 4; petals 4; fruit ovoid, 9 cm. long or larger.

3. Clusia orizabae Hemsl. Diag. Pl. Mex. 3. 1878.

Type from Izhuatlancillo, region of Orizaba, Veracruz.

Leaves elliptic or lanceolate, 10 to 15 cm. long, obtuse, cuneate at base, the petiole 2.5 cm. long or less; staminate flowers bibracteolate, the cymes with 3 or more flowers; sepals 4; petals 4.

4. Clusia salvinii Donn. Smith, Bot. Gaz. **35**: 1. 1903.

Michoacán to Oaxaca, and probably also in Sinaloa and Veracruz. Guatemala; type from Volcán de Agua.

Leaves oblong-obovate or oval-obovate, 10 to 20 cm. long, 5.5 to 10 cm. wide, cuneate at base, with numerous fine nerves divergent at an angle of about 60°; cymes few-flowered; sepals 4, 7 to 9 mm. long; petals 5, slightly longer than the sepals; fruit globose, 5-celled, 1.5 to 2 cm. in diameter. "Palo de águila" (Oaxaca).

5. Clusia flava Jacq. Enum. Pl. Carib. 34. 1760.

Specimens from Yucatán perhaps belong here. Jamaica.

Tree, about 10 meters high; leaves cuneate-obovate, 4 to 8 cm. wide, cuneate at base, short-petiolate, the lateral nerves ascending at a very acute angle;

flowers 2 to 2.5 cm. wide; sepals 4, the bractlets 4 to 8; petals 4, yellow; fruit subglobose, large. "Chunup" (Yucatán).

Used in Yucatán as a remedy for syphilitic affections.

6. **Clusia parvicapsula** Vesque, Epharm. **3**: 10. *pl. 34*. 1892.

Veracruz. Colombia and Peru.

Leaves obovate, usually 2 to 3.5 cm. wide, cuneate at base, the nerves ascending at a very acute angle; cymes 3 to 6-flowered; sepals 4, rounded; fruit about 1.5 cm. in diameter, globose.

7. **Clusia mexicana** Vesque, Epharm. **3**: 9. *pl. 24, 25*. 1892.

Veracruz and Oaxaca; type from Córdoba, Veracruz. Probably also in Central America.

Leaves oblanceolate or oblong-oblanceolate, 6 to 15 cm. long, acute at base, the lateral nerves ascending at a very acute angle; cymes with 3 or several flowers; bractlets 2 or 4; sepals 4; petals 4, white; fruit subglobose, 5 or 6-celled, 3 to 4 cm. in diameter. "Zapotillo" (Oaxaca).

2. CALOPHYLLUM L. Sp. Pl. 513. 1753.

Glabrous trees; leaves coriaceous, lustrous, the lateral nerves very numerous and close; flowers cymose-paniculate or racemose, axillary, small, polygamous; sepals 4; petals 2 to 8 or more; stamens numerous; fruit drupaceous; 1-seeded.

Petioles 22 to 32 mm. long; leaves 10 to 16 cm. long..... **1. C. rekoi.**
Petioles 8 to 10 mm. long; leaves 6.5 to 8.5 cm. long..... **2. C. chiapense.**

1. **Calophyllum rekoi** Standl. Contr. U. S. Nat. Herb. **20**: 192. 1919.

Known only from the type locality, Cerro Espino, Oaxaca, altitude 600 meters.

Tree, 20 to 25 meters high; leaves elliptic or elliptic-oblong, 4 to 6 cm. wide, acute at base and apex; racemes about 7-flowered, 2.4 to 3.5 cm. long, puberulent; flowers white, fragrant, 8 mm. broad; stamens 7 to 12; fruit globose, 4 to 5 cm. in diameter. "Cimarrón," "cedro cimarrón."

The tree is valued because of its excellent wood, which resembles mahogany. When cut, the branches yield a yellow sticky sap.

2. **Calophyllum chiapense** Standl. Contr. U. S. Nat. Herb. **20**: 192. 1919.

Known only from the type locality, Los Pinos, near Tonalá, Chiapas.

Leaves elliptic or obovate-elliptic, 2 to 4 cm. wide, obtuse or acutish, acute at base; racemes mostly 5-flowered, 2.5 cm. long, obscurely puberulent; flowers 8 to 10 mm. broad; stamens numerous. "Leche de María."

The wood is used for making cart wheels.

3. MAMMEA L. Sp. Pl. 512. 1753.

Only the following species is known.

1. **Mammea americana** L. Sp. Pl. 512. 1753.

? *Mammea emarginata* DC. Prodr. **1**: 561. 1824.

Cultivated in Veracruz and Tabasco, and perhaps elsewhere. West Indies and northern South America; cultivated in many tropical regions.

Large tree, 12 to 20 meters high; leaves short-petiolate, oval, elliptic, or elliptic-obovate, 10 to 15 cm. long or larger, rounded at apex, rounded or obtuse at base, leathery, lustrous, with numerous parallel lateral nerves; flowers polygamous, fragrant, axillary, solitary or fasciculate, pedicellate; calyx closed at first, rupturing into 2 sepals; petals usually 5, oblong, about 2 cm. long, white; stamens numerous; fruit baccate, 2-celled, 8 to 20 cm. in diameter, subglobose, brownish, the flesh yellow or reddish; seeds 1 to 4, ellipsoid, 4.5 to 7 cm. long. "Zapote mamey," "zapote niño," "zapote de Santo

Domingo," "zapote Domingo" (Veracruz); "mamey" (Tabasco, Costa Rica, Cuba, Porto Rico).

The English name for the fruit is "mammee-apple." The tree has been introduced into Mexico from the West Indies. The trunk is sometimes as much as a meter in diameter; the crown is broad, and the leaves of a deep rich green. The fruit varies somewhat in shape, being either globose or ellipsoid; its thick leathery skin is russet-colored, and when cut a yellowish sap exudes from it. The flesh is firm but juicy; its flavor somewhat resembles that of the apricot, especially when cooked. The fruit is eaten raw, often being served with wine or sugar and cream; it is also made into preserves or jam. A liqueur, known as "eau de créole" or "crème de créole," is distilled from the flowers in the French West Indies. The wood is hard, durable, and beautifully grained, and takes a high polish. It is used for building purposes and cabinetwork.

The gum obtained from the bark is used to extract chiggers from the skin and to kill ticks and other parasites upon domestic animals. In Venezuela the powdered seeds are used in the same way, and also for cutaneous diseases. Febrifuge properties have been ascribed to the leaves.

4. RHEEDIA L. Sp. Pl. 1193. 1753.

1. **Rheedia edulis** (Seem.) Triana & Planch. Ann. Sci. Nat. IV. 14: 310. 1860.
Calophyllum edule Seem. Bot. Voy. Herald 89. 1853.

Oaxaca. Central America; type from Panama.

Tree, about 15 meters high; leaves short-petiolate, lance-oblong or narrowly oblong, 6 to 13 cm. long, obtuse or acutish at base and apex, glabrous, coriaceous; peduncles axillary, usually fasciculate, 1-flowered, 1.5 to 2 cm. long; sepals 2; petals 4, about 6 mm. long; stamens 10 to 12; fruit olive-like, about 2.5 cm. long, 1 or 2-seeded, with scant flesh. "Jorco" (Costa Rica); "sastra" (Panama).

The fruit is sweet and edible. This is probably the plant reported by Sessé and Mociño[1] as *Rheedia lateriflora*, a name which belongs to a West Indian species.

104. FRANKENIACEAE. Frankenia Family.

1. FRANKENIA L. Sp. Pl. 331. 1753.

Small much-branched shrubs with jointed stems; leaves small, opposite, estipulate, entire, often fasciculate; flowers perfect, solitary, sessile, pink; calyx tubular, persistent, 4 to 6-lobate; petals 4 to 6, free, imbricate; stamens usually 6; fruit a capsule, 1-celled, usually with 3 parietal placentae, included in the calyx, the seeds 2 to several.

Leaves flat when fresh; style 3-cleft; ovules numerous_____1. **F. grandifolia.**
Leaves with strongly revolute margins; style 2-cleft; ovules 2 or 3.
2. **F. palmeri.**

1. **Frankenia grandifolia** Cham. & Schlecht. Linnaea 1: 35. 1826.

In saline or alkaline soil, northern Baja California. California.

Plants chiefly herbaceous, suffrutescent at base, 30 cm. high or less, puberulent; leaves obovate to oblong, mostly 8 to 15 mm. long, obtuse, short-petiolate; calyx 6 to 7 mm. long, angulate, pilosulous; petals usually 5, purple; stamens 4 to 7. "Hierba reuma" (California).

The plant has a salty flavor and contains a large amount of sodium chloride. It also contains about 6 per cent of tannin. The extract of the plant is applied topically and also taken internally for catarrhal affections, especially those of the nasal and genito-urinary passages.

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[1] Pl. Nov. Hisp. 86. 1887.

Frankenia grandifolia campestris A. Gray.[1] is a form with smaller narrower leaves and shorter pubescence. It has been collected in Coahuila and occurs also in Nevada and southern California.

2. **Frankenia palmeri** S. Wats. Proc. Amer. Acad. **11**: 124. 1876.

Chiefly in salt marshes, Baja California and upon the adjacent islands; type from the east coast. Southern California.

Stems woody almost throughout, gray; leaves linear or filiform, mostly 2 to 6 mm. long but sometimes as much as 10 mm., scaberulous, usually with a white incrustation; calyx 3 to 4 cm. long; stamens 4.

105. TAMARICACEAE. Tamarisk Family.

1. TAMARIX L. Sp. Pl. 270. 1753.

The species are all natives of the Old World, chiefly of the Mediterranean region. Several of them have medicinal properties and some yield dyestuffs. Some of the species, when punctured by a scale insect, produce an exudate known as manna.

1. **Tamarix gallica** L. Sp. Pl. 270. 1753.

Cultivated for ornament especially in the arid portions of northern Mexico; sometimes escaping. Native of southern Europe and northern Africa; cultivated in the southern part of the United States.

Glabrous shrub or small tree, sometimes 9 meters high, with slender branches; leaves alternate, minute, scalelike, sessile, acute; flowers pink or white, in dense bracted spikes; sepals 4 or 5; petals 4 or 5, scarcely more than 1 mm. long; anthers yellow or purple; fruit a small capsule containing numerous seeds.

The English names are tamarisk and salt-cedar. In Spain the shrub is known as "tamarisco," "tamariz," "taray," "atarfe," and "talaya." The shrub will thrive under the most varied conditions, in either dry or wet ground. In the southwestern United States it is a favorite ornamental plant because it grows well in the most arid places. It is able also to endure salt and alkali in the soil. Frequently it is planted for hedges, and if kept trimmed it forms a dense handsome hedge of pale green. The branches suggest those of cedar (*Juniperus*), but they are much more slender. The plant is easily grown from cuttings.

In its native countries the tamarisk is prized as a source of charcoal. The branches are used for basketry and wattlework. All parts of the shrub are bitter and the bark contains tannin. Tonic, astringent, sudorific, and diuretic properties are ascribed to it. In Europe the leaves and branches are sometimes employed in the preparation of a kind of beer.

106. FOUQUIERIACEAE. Ocotillo Family.

REFERENCE: Nash, A revision of the family Fouquieriaceae, Bull. Torrey Club **30**: 449–459. 1903.

Shrubs or trees; spines developing within the petioles on young branches, becoming apparent after the fall of the leaves; leaves alternate, entire, petiolate; flowers perfect, spicate, racemose, or paniculate, terminal; sepals 5, imbricate; corolla gamopetalous, the lobes imbricate; stamens 10 to 15, unequal, exserted; fruit a 3-celled capsule, 3-valved; ovules 4 to 6 in each cell; seeds compressed, at first broadly winged, the wing breaking up into long filaments.

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[1] Syn. Fl. **1**[1]: 208. 1895.

Styles wholly united, stout, short, included; tree with a thick, columnar, usually simple trunk; corolla yellow_____1. **IDRIA.**
Styles free at apex, slender, exserted; shrubs or trees with branched trunks; corolla usually red_____2. **FOUQUIERIA.**

1. **IDRIA** Kellogg, Hesperian **4**: 101. 1860.

A single species is known.

1. **Idria columnaris** Kellogg, Hesperian **4**: 101. 1860.
Fouquieria columnaris Kellogg; Curran, Bull. Calif. Acad. **1**: 133. 1885.
Fouquieria gigantea Orcutt, West Amer. Sci. **2**: 48. 1886.
Baja California; type locality, Sebastián Bay.

Trunk 3 to 18 meters high, tapering from base to apex, with numerous slender lateral branches, these leafy, covered with slender spines 2 to 3.5 cm. long; leaves oblanceolate or obovate, 1.5 to 2 cm. long; flowers in large panicles borne at the summit of the trunk, nearly sessile, 12 to 14 mm. long; sepals 4 mm. long, rounded; corolla 6 to 7 mm. long; stamens 10; capsule 8 to 10 mm. long. "Cirio."

This is one of the most curious and remarkable plants of Baja California, because of its weird appearance and strange habit of growth. It grows on sandy flats and rocky hills at low altitudes, and in many places is abundant, forming regular forests. The trunks sometimes send forth a few large erect branches above the middle; at the base they are often nearly a meter in diameter. The older trees frequently become topheavy and lop over, thus assuming fantastic forms. The wood is soft and spongy. The trunks are often hollow, and sometimes inhabited by bees. For illustrations of the plant see Contr. U. S. Nat. Herb. **16**: *pl. 121, 122.*

The following account of the tree by Clavígero (Historia de la California, 1789) is doubtless the first published description of it: "Much more curious is another tree, called by the Cochimí *milapá*, which is common from the twenty-ninth to the thirty-first degree, and had not been seen by the missionaries before the year 1751, for they had not entered that part of the country; nor is it, as I believe, known even yet among naturalists. It is so large that it rises perpendicularly to a height of 70 feet; its trunk, proportionately thick, is not woody but soft and juicy, like the branches of the *pitahayo* and *cardón;* its branches are certain twigs, a foot and a half long, adorned with small leaves and with a spine at the tip; the direction of the branches is not upward or horizontal, like those of most trees, but they hang down like beard from tip to the base of the trunk, and upon them are bunches of flowers, but no fruit has ever been seen. This great tree is of no use, for even when dry it is not good for fuel; nevertheless, in the mission of San Francisco de Borja they used to burn it for lack of other firewood."

2. **FOUQUIERIA** H. B. K. Nov. Gen. & Sp. **3**: 452. 1819.

Spiny shrubs or trees, with a distinct trunk, or often dividing at the base into slender erect branches, leafless for most of the year; flowers usually red, spicate or paniculate; corolla cylindric or campanulate, the tube equaling or longer than the lobes; stamens 10 to 15.

The following species are the only ones known.

Leaves nearly linear, 2 to 3 mm. wide_____1. **F. purpusii.**
Leaves oblong to broadly obovate, usually more than 5 mm. wide.
Corolla tube campanulate, little if at all exceeding the lobes.
Capsule about 2 cm. long; filaments not appendaged_____2. **F. burragei.**
Capsule 1 to 1.5 cm. long; filaments appendaged_____3. **F. fasciculata.**

Corolla tube cylindric, more than twice as long as the lobes.
Inflorescence spicate, the flowers sessile_____4. **F. formosa.**
Inflorescence paniculate, the flowers pedicellate.
Filaments with a scalelike appendage near base; panicle long and narrow; plants usually without a trunk_____5. **F. splendens.**
Filaments not appendaged; panicle broad or conic; plants commonly with a trunk.
Panicle corymbiform, the pedicels long and slender.
6. **F. macdougalii.**
Panicle conic, the pedicels short and stout_____7. **F. peninsularis.**

1. **Fouquieria purpusii** T. S. Brandeg. Univ. Calif. Publ. Bot. **3**: 386. 1909.

Known only from Cerro de Coscomate, Oaxaca, on rocky slopes at an altitude of 2,000 to 2,200 meters.

Tree, 4 to 8 meters high, the trunk 50 cm. thick or more at base, tapering upward, gray, with spreading branches; leaves 3 to 5 cm. long; spines 3 to 4 cm. long; inflorescence corymbose-paniculate, the flowers short-pedicellate; corolla 1 cm. long, white, the lobes acuminate; stamens 10; capsule 1 cm. long.

For an account of the species, accompanied by two illustrations, see A. Purpus in Möller's Deutsche Gärtner-Zeitung **25**: 8–9. 1910. In habit the plant resembles *Idria columnaris*, the trunk suggesting an inverted carrot.

2. **Fouquieria burragei** Rose, Journ. N. Y. Bot. Gard. **12**: 267. 1911.

Known only from the type locality, Pichilinque Island, Baja California.

Shrub or tree, 3 to 7 meters high, with very short trunk and long simple spiny branches; spines about 1 cm. long; inflorescence simple or with few branches, the flowers subsessile; corolla 10 to 12 mm. long, pale purple or nearly white.

3. **Fouquieria fasciculata** (Roem. & Schult.) Nash, Bull. Torrey Club **30**: 452. 1903.

Cantua fasciculata Roem. & Schult. Syst. Veg. **4**: 369. 1819.
Fouquieria spinosa H. B. K. Nov. Gen. & Sp. **3**: 452. 1820.
Bronnia spinosa H. B. K. Nov. Gen. & Sp. **6**: 84. *pl. 528*. 1823.
Fouquieria campanulata Nash, Bull. Torrey Club **30**: 457. 1903.
Fouquieria splendens micrantha Loesener, Repert. Sp. Nov. Fedde **9**: 357. 1911.

Durango to Querétaro and Hildago; type from Puente de la Madre de Dios (Hidalgo ?); perhaps also in Coahuila.

Shrub or tree, 4 meters high or larger; leaves oblong-obovate or spatulate, 2 to 3 cm. long, obtuse or rounded at apex; panicle usually narrow, the flowers short-pedicellate; corolla red, 10 to 14 mm. long. "Ocotillo," "teocotillo," "albarda," "alabarda," "barda" (Durango).

It is probably this species which, according to Altamirano, is known in Querétaro as "chiquiña." The pulverized seeds are used in Durango as a remedy for toothache, and the stems for fences and sides of huts.

The species was described from fruiting material, and the inflorescence is described and illustrated as being corymbose-paniculate. It may be, therefore, that the name *fasciculata* does not apply to the plants placed here by the writer. Material from Hidalgo agrees with Durango specimens upon which *Fouquieria campanulata* is based, and since no other species is represented in recent collections from Hidalgo, it seems probable that the names *F. fasciculata* and *F. campanulata* refer to the same species.

4. **Fouquieria formosa** H. B. K. Nov. Gen. & Sp. **6**: 83. *pl. 527*. 1823.

Philetaeria horrida Liebm. Dansk. Vid. Selsk. Skrivt. V. **2**: 283. 1851.

Jalisco to Oaxaca, Morelos, and Mexico.

Shrub or tree, 2 to 6 meters high or larger, much branched, with a thick trunk, very spiny; leaves elliptic or obovate, 2 to 3 cm. long, rounded at apex; spikes 15 cm. long or shorter; corolla bright red, about 2.5 cm. long and 7 mm. thick. "Palo santo" (Puebla); "rosalillo" (Jalisco, *Oliva*).

5. Fouquieria splendens Engelm. in Wisliz. Mem. Tour North. Mex. 98. 1848.

Northern Baja California to Sonora, Chihuahua, and Coahuila; probably also in Zacatecas. Western Texas to southern California; type from Jornada del Muerto, New Mexico.

Shrub, 2 to 6 meters high, with numerous simple slender branches rising from the base; leaves oblanceolate to rounded-obvate, 2 to 3 cm. long; panicles 5 to 20 cm. long; corolla bright red (very rarely white), 2 to 2.5 cm. long. "Ocotillo" (Chihuahua, Coahuila, Zacatecas, Baja California, Texas, New Mexico); "albarda" (Zacatecas, Coahuila); "barda" (Coahuila).

In the United States the plant has been called "coachwhip," "vine-cactus," and "Jacob's-staff," but the word "ocotillo" is more generally used and is a better name. It is sometimes corrupted into "ocotilla" and "ochotilla."

This is one of the most common and characteristic plants of the desert regions of northern Mexico and the southwestern United States, growing upon plains and rocky hillsides. For most of the year the plants are leafless spiny sticks, apparently dead, but in summer when rains fall they put out their bright green leaves and, at the tip of the branch, dense masses of vivid red flowers. The leaves soon fall. The wood is heavy and resinous. The branches are frequently made into walking-sticks, and they are employed to make fences or the sides of huts. If planted in the ground they often grow and form a living hedge.

The bark contains gum, resin, and wax. Palmer reports that the flowers are employed in Coahuila as a remedy for coughs. The Coahuilla Indians of southern California eat the flowers and seed pods, and prepare a sweet beverage by soaking the flowers in water.

6. Fouquieria macdougalii Nash, Bull. Torrey Club **30**: 454. 1903.

Fouquieria jaboncillo Loesener, Repert. Sp. Nov. Fedde **9**: 356. 1911.

Sonora and Sinaloa; type locality, Torres, Sonora.

Tree, sometimes 7 meters high, the trunk 10 to 20 cm. thick, short, yellowish green, the branches brown, their spines 1 to 2 cm. long; leaves lanceolate to broadly obovate, 2 to 4 cm. long, acute to rounded at apex; panicles usually fully as broad as long, lax; corolla bright red, 2.5 cm. long. "Palo verde," "jaboncillo," "chunari," "torotillo" (Sinaloa); "torote verde" (Sonora, Sinaloa).

The bark is employed as a substitute for soap, especially in washing woolen goods.

7. Fouquieria peninsularis Nash, Bull. Torrey Club **30**: 455. 1903.

Southern Baja California and adjacent islands, Sonora, and Sinaloa, usually near the coast; type from La Paz, Baja California.

Shrub, 2 to 3 meters high, with very short trunk; panicles 5 to 15 cm. long, many-flowered; corolla bright red, 2 cm. long. "Palo de Adán," "cirio" (Baja California).

This grows with *F. splendens* in Baja California, but is distinguished from that species by the definite trunk. It is abundant there in many places, usually growing in sandy places. For an illustration of a plant see Contr. U. S. Nat. Herb. **16**: *pl. 120*.

The plant is mentioned first by Clavigero (Historia de la California, 1789), who writes of it as follows: "There is also another small tree bristling with long spines, and almost always naked, for which reason the Spaniards gave it

the name of *palo Adán* [Adam's tree]. When there is rain it sends forth a few small leaves, but after a month it sheds them and remains naked all the year."

107. CISTACEAE. Rock-rose Family.

REFERENCE: Grosser in Engl. Pflanzenreich IV. 193. 1903.

The only other genus represented in Mexico is *Lechea*, of which two species occur. They are distinguished from *Halimium* by having 3 instead of 5 petals.

1. HALIMIUM Spach, Ann. Sci. Nat. II. 6: 365. 1836.

Plants herbaceous or suffrutescent, slender; leaves alternate, narrow, entire, estipulate; flowers racemose, subumbellate, paniculate, or glomerate, all petaliferous or partly cleistogamous; sepals 5, the 3 outer ones much narrower than the others; petals 5 in the petaliferous flowers, yellow, fugacious; stamens numerous; fruit a glabrous capsule, 3-valvate, many-seeded.

The plants of this genus have usually been referred to *Helianthemum*, but recent writers restrict that to certain Old World plants.

Some of the United States species are known as frostweed and rock-rose. They contain a volatile oil, tannin, and apparently a glucoside, having a bitter and astringent taste and tonic and astringent properties. Formerly they were employed as a remedy for diarrhea and scrofulous affections, and as a gargle in the treatment of scarlatina.

Leaves linear, mostly 1 to 3 cm. long, green. Flowers all petaliferous and pedicellate ..... **1. H. aldersonii.**
Leaves broader or, if linear, less than 1 cm. long and grayish-pubescent.
  Stems hirsute or pilose with long spreading hairs ..... **2. H. chihuahuense.**
  Stems covered with a close, usually appressed, stellate pubescence.
    Pedicels of the petaliferous flowers much longer than those of the cleistogamous flowers; cleistogamous flowers sessile or nearly so.
    Leaves linear ..... **3. H. argenteum.**
    Leaves oblanceolate or broader.
      Sepals of the petaliferous flowers 3 to 4 mm. long; leaves covered beneath with a dense grayish tomentum ..... **4. H. glomeratum.**
      Sepals of the petaliferous flowers 5 to 6 mm. long; leaves green beneath, with scattered stellate hairs ..... **5. H. exaltatum.**
  Pedicels all elongate, those of the two kinds of flowers subequal, or the flowers sometimes all petaliferous.
    Flowers subumbellate at the ends of the branches; leaves mostly 5 to 15 mm. wide ..... **6. H. coulteri.**
    Flowers scattered along the upper part of the branches, not umbellate; leaves mostly 2 to 5 mm. wide.
      Leaves oblanceolate-linear, broadest at the apex; flowers probably all petaliferous ..... **7. H. nutans.**
      Leaves mostly oblong or oblong-oblanceolate, broadest about the middle; flowers partly cleistogamous.
        Pedicels about as long as the calyx; stems simple below, strict. **8. H. pringlei.**
        Pedicels usually twice as long as the calyx; stems usually branched below, weak ..... **9. H. patens.**

1. Halimium aldersonii (Greene) Standl.

Helianthemum aldersonii Greene, Erythea 1: 259. 1893.

Dry hillsides, northern Baja California. Southern California, the type from San Diego County.

Plants suffrutescent, 30 to 60 cm. high, with numerous erect branches; leaves sessile, 1 to 2 mm. wide, obscurely stellate-puberulent but green; flowers all

on long filiform pedicels; inner sepals ovate-acuminate, 6 to 7 mm. long in anthesis; petals 8 to 13 mm. long.

By Grosser this is considered a synonym of *H. scoparium* (Nutt.) Grosser, but it appears to be fairly distinct from that (California) species in its much larger flowers.

2. **Halimium chihuahuense** (S. Wats.) Grosser in Engl. Pflanzenreich IV. **193**: 45. 1903.

Helianthemum chihuahuense S. Wats. Proc. Amer. Acad. **23**: 268. 1888.

Chihuahua and Hidalgo; type from pine plains at base of the Sierra Madre, Chihuahua.

Plants suffrutescent at base, 30 cm. high or less; leaves oblong or oblanceolate-oblong, 1 to 2 cm. long, obtuse or acute, ciliate and pilose; pedicels subequal, shorter than the calyx; inner sepals of the petaliferous flowers in fruit 6 mm. long; petals twice as long as the sepals.

Besides the type collection, the writer has seen only a single specimen, one collected between Somoriel and Las Lajas, Sinaloa. This represents a taller, more strict plant, but does not appear to differ otherwise from the Chihuahua plant. Grosser gives as a synonym "*Cistus ciliaris* Moc. in sched.," so he must have seen at least one Mexican specimen besides the type, although he cites no other.

3. **Halimium argenteum** (Hemsl.) Grosser in Engl. Pflanzenreich IV. **193**: 47. 1903.

Helianthemum argenteum Hemsl. Diag. Pl. Mex. 20. 1879.

Region of San Luis Potosí, the type locality.

Plants much branched, suffrutescent, about 10 cm. high; leaves sessile, crowded, acute, 1 to 1.5 mm. wide, densely white-pilosulous; pedicels 1.5 mm. long or less; inner sepals of petaliferous flowers 5 mm. long in fruit; capsule 4 mm. long.

4. **Halimium glomeratum** (Lag.) Grosser in Engl. Pflanzenreich IV. **193**: 47. 1903.

Cistus glomeratus Lag. Gen. & Sp. Nov. 16. 1816.

Trichasterophyllum hyssopifolium Link, Jahrb. Gewächsk. 1^3: 69. 1820.

Helianthemum glomeratum Lag.; DC. Prodr. **1**: 269. 1824.

Helianthemum astylum Dunal; DC. Prodr. **1**: 284. 1824.

Helianthemum obcordatum Dunal; DC. Prodr. **1**: 284. 1824.

Taeniostemma micranthum Spach; Hook. Comp. Bot. Mag. **2**: 289. 1836.

Heteromeris mexicana Spach, Hist. Nat. Vég. Phan. **6**: 104. 1838.

Sonora and Chihuahua to San Luis Potosí, Morelos, and Oaxaca; types from Acapulco and Zimapán. Guatemala and Costa Rica.

Plants suffrutescent, usually 50 cm. high or less, branched above, minutely stellate-tomentulose; leaves short-petiolate, oblanceolate-oblong or lance-spatulate, 1 to 3 cm. long; pedicels of petaliferous flowers often 2 to 2.5 cm. long, the flowers sometimes all cleistogamous; sepals of cleistogamous flowers 1 to 1.5 mm. long; capsules 6 mm. long in the petaliferous and 2 mm. in the cleistogamous flowers. "Juanita" (San Luis Potosí, Jalisco, Valley of Mexico).

A decoction of the plants is used as a remedy for indigestion and diarrhea, and the dried plants are commonly sold in the markets for that purpose.

This is probably *Cistus mexicanus* Sessé & Moc.[1]

5. **Halimium exaltatum** Rose & Standl., sp. nov.

Sinaloa and Michoacán; type from dry hills above Uruapan, Michoacán, altitude 1,500 meters (*Pringle* 10409; U. S. Nat. Herb. no. 463505).

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[1] Pl. Nov. Hisp. 87. 1887.

Erect shrub, 1 meter high or less, the stems strict, coarsely stellate-pubescent; leaves short-petiolate, obovate or obovate-oblong, 2 to 3.5 cm. long, 5 to 13 mm. wide, acute or obtuse, green, sparsely stellate-pubescent on both surfaces; flowers crowded at the ends of the branches, numerous; pedicels of the petaliferous flowers equaling or shorter than the sepals, the inner sepals in anthesis 5 to 6 mm. long, stellate-pilosulous, the outer sepals linear, half as long, the petals nearly twice as long as the sepals; cleistogamous flowers sessile or subsessile, smaller; capsules 4 to 4.5 mm. long, brown, glabrous.

The type collection was distributed as a new species of *Helianthemum* under a specific name already employed in that genus. *Pringle* 13447 from Uruapan belongs to this species.

6. **Halimium coulteri** (S. Wats.) Grosser in Engl. Pflanzenreich IV. **193**: 46. 1903.

Helianthemum coulteri S. Wats. Proc. Amer. Acad. **17**: 323. 1882.

San Luis Potosí, Mexico, Hidalgo, and Puebla; type from Zimapán, Hidalgo.

Stems chiefly or wholly herbaceous, 10 to 20 cm. high, sparsely branched; leaves short-petiolate, elliptic, elliptic-oblong, or obovate, 1.5 to 3.5 cm. long, rounded to acute at apex, minutely pale-tomentulose beneath; pedicels equaling or longer than the calyx; inner sepals of petaliferous flowers 5 to 7 mm. long in anthesis, 7 to 9 mm. long in fruit. "Juanita" (San Luis Potosí).

This species was reported by Hemsley as *Helianthemum arenicola* Chapm.

7. **Halimium nutans** (T. S. Brandeg.) Standl.

Helianthemum nutans T. S. Brandeg. Proc. Calif. Acad. II. **2**: 129. 1889.

Known only from the type locality, Llanos de San Julián, Baja California.

Slender branched shrub, densely leafy; leaves 2 to 6 mm. long, obtuse, very minutely stellate-pubescent; pedicels slender, recurved, longer than the calyx; sepals in fruit 6 to 7 mm long.

8. **Halimium pringlei** (S. Wats.) Grosser in Engl. Pflanzenreich IV. **193**: 46. 1903.

Helianthemum pringlei S. Wats. Proc. Amer. Acad. **23**: 268. 1888.

Chihuahua and Durango; type from plains at base of the Sierra Madre, Chihuahua. Guatemala.

Plants erect, 30 to 50 cm. high; leaves sessile or nearly so, oblong or oblong-oblanceolate, 1 to 2.5 cm. long, obtuse or acute, minutely stellate-tomentose; sepals of petaliferous flowers 6 to 8 mm. long, the petals about twice as long; capsules of petaliferous flowers 7 mm. long.

9. **Halimium patens** (Hemsl.) Grosser in Engl. Pflanzenreich IV. **193**: 46. 1903.

Helianthemum patens Hemsl. Diag. Pl. Mex. 20. 1879.

? *Halimium berlandieri* Briq. Ann. Cons. Jard. Genève **9–10**: 99. 1907.

San Luis Potosí, Hidalgo, and Puebla; type from the region of San Luis Potosí.

Plants suffrutescent at base, 10 to 25 cm. high, slender, spreading; leaves sessile. mostly oblong or elliptic, 7 to 15 mm. long, obtuse or acute, stellate-pubescent, green; inner sepals of petaliferous flowers 4 to 5 mm. long, the petals nearly twice as long.

108. BIXACEAE. Arnotto Family.

1. BIXA L. Sp. Pl. 512. 1753.

The following is the only species.

1. **Bixa orellana** L. Sp. Pl. 512. 1753.

Sinaloa to Veracruz, Yucatán, Tabasco, and Chiapas. West Indies, Central America, and South America.

Shrub or small tree, 2 to 9 meters high; leaves alternate, long-petiolate, broadly ovate, mostly 8 to 20 cm. long, acuminate, truncate, or rounded at base, entire, minutely lepidote beneath; flowers perfect, in terminal panicles, pink; sepals 5, imbricate, deciduous; petals 5, 1.5 to 2.5 cm. long; fruit a capsule, subglobose or ovoid, 2 to 3.5 cm. long, covered with long spinelike bristles, or rarely smooth; seeds numerous, with a fleshy, bright orange covering. "Achiote" (Michoacán, Guerrero, Sinaloa, Veracruz, Jalisco, Oaxaca, Guatemala, Costa Rica, Colombia, Cuba, Peru, Argentina, Ecuador; from the Nahuatl *achiotl*); "achiotillo" (Tabasco); "arnato," "urucu" (Yucatán); "chancanguarica," "pumacua" (Morelos, *Ramírez*); "bixa" or "bija" (Panama, Colombia, Cuba); "achuete" (Philippines, a corruption of *achiote*); "achote" (Guatemala, Colombia); "onoto" (Colombia, Venezuela); "cacicuto" (Cuba); "rocou" (Guiana); "bichet" (Carib, women); "emátabi" (Carib, men).

The arnotto tree or shrub is one of the best known of tropical American plants because of the yellow-red dye obtained from the fruit. This dye has long been employed by the aborigines and is now an article of commerce, and the plant is frequently cultivated. In order to obtain the coloring matter the seed pods are crushed and thrown in water, whereupon it is dissolved. The liquid is then strained, the coloring matter settles to the bottom, the water is drawn off, and the sediment is formed into cakes, in which form the dyestuff is shipped. Sometimes the fruits are placed in water and allowed to ferment, during which process the dyestuff separates and settles. The dye is used for coloring silk and cotton orange-yellow, but the color is said to be fugitive. It is employed extensively for coloring cheese and butter, as well as oils and varnish. Large quantities are imported into Europe and the United States, the supply coming largely from South America. In tropical America arnotto (written also anatto, and in various other forms) is employed for coloring food, especially rice, and for flavoring chocolate and other articles. By the Indians it has been and still is employed extensively for painting the face and body, partly for ornament and partly to prevent the attacks of mosquitoes and other insects. At an early date the plant was introduced into the Pacific islands, and the natives there soon learned to use the dye for painting their bodies. The coloring properties of the dye are dependent upon two principles, bixin and orellin.

The wood is described as nearly white, porous, and very soft, with a specific gravity of 0.399. It is of little or no use. The Indians employed it to obtain fire by friction. The stems, crushed and thrown in water, yield a gum somewhat resembling gum arabic. The bark contains a strong fiber, from which cordage is sometimes made.

Arnotto is much used in domestic medicine in tropical America. Astringent, febrifuge, antidysenteric, diuretic, aphrodisiac, and other properties are ascribed to it and it is employed for venereal diseases, erysipelas, intermittent fevers, epilepsy, and other affections. The pulp, if applied immediately to burns, is said to prevent the formation of blisters or scars. The leaves are applied as poultices to relieve headache. A decoction of them is employed as a gargle for sore throat. The seeds are said to be the best antidote for poisoning by yuca agria or yuca brava (*Manihot*).

Heckel[1] states that in Madagascar, where the plant is cultivated, the Malagaches who have to speak or dance in public take an infusion of the leaves to make themselves bold and courageous. In Brazil the pulp of the seeds has been given to bulls about to appear in the ring in order to make them more lively and dangerous. It may be that the plant contains some excitant principle which has not yet been investigated.

The specific name of the arnotto plant, *orellana*, was given in honor of Don Francisco Orellana, the disloyal but famous comrade of Pizarro, and discoverer

[1] Les plantes utiles de Madagascar. p. 183. 1910.

of the Amazon, who achieved one of the most remarkable explorations of history in his descent of that river from its headwaters.

For an illustration of *Bixa orellana* see Contr. U. S. Nat. Herb. **9**: *pl. 39.*

The following interesting account of the arnotto plant is given by Oviedo (Lib. VIII, Cap. VI), who was probably the first to describe it: "*Bixa* is a wild shrub or plant, like the others I have mentioned, but like them it is sometimes cultivated by the Indians. This plant or *bixa* grows in Hispaniola and the other islands and in Tierra-Firme, and its about half as high again as a man. It has leaves like those of cotton and bears capsules resembling those of that plant, except that outside they are covered with coarse hairs and marked with veins that indicate the interior partitions, and on the inside are red seeds, sticky like wax or more so; and from these the Indians make balls with which they paint their faces, mixing the dye with certain gums, and from this they make a fine vermilion color with which they paint the face and body in such an elegant fashion that they resemble the devil himself. The women do likewise when they hold their feasts and dances, and the men when they wish to appear well and when they go to war, in order to appear fierce. It is very hard to remove the *bixa* until many days pass, but it is astringent and they say very comfortable, and even beneficial in this way, that when they are thus painted if they are wounded, since the paint and the blood are of the same color, the men are not frightened as much as they would be if they were not painted red, but this they attribute to the virtues of the *bixa*. The paint, besides its evil appearance, has a disagreeable odor because of the gums and other things mixed with it." The plant is figured and described also by Hernández.[1]

109. COCHLOSPERMACEAE. Cochlospermum Family.

The only other genus of this family in Mexico is *Amoreuxia*, which is represented by three species of low herbs.

1. MAXIMILIANEA Mart. Flora **2**: 451. 1819.

1. **Maximilianea vitifolia** (Willd.) Krug & Urb. Bot. Jahrb. Engler **15**: 293. 1892.

Bombax vitifolium Willd. Enum. Pl. 720. 1809.

Cochlospermum hibiscoides Kunth, Syn. Pl. Aequin. **3**: 214. 1824.

Cochlospermum serratifolium DC. Prodr. **1**: 527. 1824.

Cochlospermum vitifolium Spreng. Syst. Veg. **2**: 596. 1825.

Sonora to Veracruz, Yucatán, and Chiapas. Central America and South America; cultivated in the West Indies and elsewhere.

Tree, 5 to 12 meters high, with red-brown branches; leaves alternate, long-petiolate, 10 to 30 cm. wide, cordate at base, deeply and palmately 5-lobate, the lobes acuminate, crenate-serrate, glabrate; flowers in terminal clusters, pedicellate, 10 cm. broad or larger, bright yellow; sepals 5, imbricate, tomentulose, deciduous; petals 5, emarginate; stamens numerous; fruit a 5-valvate capsule, globose-obovoid, 7 to 8 cm. long, depressed at apex, finely velvety-pubescent, striate-nerved; seeds numerous, reniform, covered with long cotton-like white hairs. "Chuun," "chum," "chimu" (Yucatán, Maya); "cocito" (Chiapas); "rosa amarilla" (Sinaloa); "apompo," "pongolote," "pochote," "cojón de toro" (Oaxaca); "madera de pasta" (Veracruz, *Ramírez*); "tecomaxochitl" (Nahuatl); "palo amarillo," "palo de rosa amarilla" (Durango); "quieriga," "quie-quega," "huarumbo," "flor izquierda" (Chiapas and Oaxaca, *Seler*); "panaco" (Guerrero); "bombón," "catamericuche" (Nicaragua); "poró-poró" (Nicaragua, Panama, Costa Rica, Colombia); "tecomasúchil" (Chiapas, Guatemala); "tecomasuche" (Guatemala); "botulo" (Ecuador);

[1] Thesaurus 74. 1651.

"carnestolendas" (Colombia, Venezuela); "bototo," "flechero," "batabana" (Colombia); "botija" (Cuba).

When in flower this is one of the most showy of Mexican plants. The trees are usually quite leafless when they flower, but they are one great mass of showy yellow blossoms. The branches take root readily when stuck in the ground, and they are often planted to form hedges. The bark contains a fiber which is used locally for cordage. A decoction of the wood or leaves is a popular cure for jaundice, and the flowers are employed as a remedy for chest affections. The wood is soft and brittle.

110. VIOLACEAE. Violet Family.

(Contributed by S. F. Blake.)

Herbs or shrubs, sometimes scandent; leaves usually alternate, stipulate, entire or toothed; flowers variously arranged, regular or irregular; sepals 5; petals 5; stamens 5, the connectives (in ours) dilated and produced beyond the anther cells; ovary 1-celled, with 3 parietal placentae; ovules solitary to numerous; fruit (in ours) a 3-valved capsule.

Lower petal spurred ..... 1. **CORYNOSTYLIS.**
Lower petal not spurred.
  Corolla somewhat irregular; stamens united ..... 2. **HYBANTHUS.**
  Corolla regular; stamens free ..... 3. **RINOREA.**

1. CORYNOSTYLIS Mart. & Zucc. Nov. Gen. & Sp. 1: 25. 1823.

1. Corynostylis arborea (L.) Blake.

Viola arborea L. Syst. Nat. ed. 10. 1239. 1759.
Viola hybanthus L. Sp. Pl. ed. 2. 1328. 1763.
Corynostylis hybanthus Mart. & Zucc. Nov. Gen. & Sp. 1: 26. 1823.
Calyptrion berterii Ging. in DC. Prodr. 1: 289. 1824.
Calyptrion berterii β. mexicanum Ging. in DC. Prodr. 1: 289. 1824.
Corynostylis berterii Spreng. Syst. Veg. 1: 805. 1825.

Veracruz to Yucatán. Guatemala to South America; type from Venezuela.

"Scandent" shrub; leaves alternate, oval to elliptic-ovate, 5 to 9 cm. long, crenulate, firm, glabrous; petioles 6 mm. long; racemes terminal, leafy-bracted, the pedicels very slender, 3 to 4 cm. long; flowers whitish, strongly zygomorphic; lip with strongly dilated tip, the stout blunt spur about 1.8 cm. long, longitudinally half-twisted; capsule woody, many-seeded, the seeds subquadrate, compressed.

The root is used as an emetic in South America.

2. HYBANTHUS Jacq. Enum. Pl. Carib. 2. 1760.

Slender shrubs with whitish bark, often with spinescent branchlets; leaves alternate, often fascicled; flowers somewhat irregular, the lower petal larger than the others and more or less saccate at base; sepals subequal; dilated connectives of the anthers connate below; capsule 3-valved, 3-seeded.

Fascicles of flowers not pedunculate; connective appendages acuminate. 1. **H. mexicanus.**
Fascicles of flowers pedunculate; connective appendages rounded. 2. **H. yucatanensis.**

1. Hybanthus mexicanus Ging. in DC. Prodr. 1: 312. 1824.

Alsodeia parvifolia S. Wats. Proc. Amer. Acad. 25: 142. 1890.

San Luis Potosí; apparently also in the Cape Region, Baja California.

Leaves alternate, oblanceolate or rhombic-oblanceolate, crenate-serrate, 1.5 to 7 cm. long, long-cuneate at base, essentially glabrous; flowers whitish, about 2.5 mm. long, in few-flowered axillary clusters, on pedicels about 3 mm. long; capsule 4 mm. long.

2. **Hybanthus yucatanensis** Millsp. Field Mus. Bot. **1**: 404. 1898.

Known only from the type locality, Izamal, Yucatán.

Shrub, about 2.5 meters high; leaves alternate or fascicled, the blades rhombic or rhombic-lanceolate, 2.5 to 3 cm. long, crenate-serrulate, glabrous; peduncles axillary, 1 cm. long, at apex bifurcate and bearing about 15 fascicled flowers; keel petal about 2.5 mm. long, with dilated apex.

3. RINOREA Aubl. Pl. Guian. 1: 235. 1775.

Shrubs or trees; leaves (in ours) opposite; stipules small, deciduous; flowers regular, in axillary racemes (in ours); sepals 5, equal; petals 5, lance-ovate, recurved at apex; stamens 5, free, the connectives dilated into a scale exceeding the anthers; fruit a capsule, in ours 3-seeded.

Anther cells not appendaged at apex; connective scales subentire. **1. R. pilosula.**

Anther cells appendaged at apex; connective scales coarsely erose. **2. R. guatemalensis.**

1. **Rinora pilosula** Blake, sp. nov.

Type from San Juan Bautista, Tabasco (*Rovirosa* 100; U. S. Nat. Herb. no. 40190).

Pilosulous shrub, glabrate; leaf blades oval or obovate-oval, 7.5 to 11.5 cm. long, crenate or crenate-serrulate, nearly glabrous; petioles pilosulous, 6 mm. long; racemes rufidulous-pilosulous, 8 cm. long; petals 5 mm. long.

2. **Rinorea guatemalensis** (S. Wats.) Bartlett, Proc. Amer. Acad. **43**: 56. 1907.

Alsodeia guatemalensis S. Wats. Proc. Amer. Acad. **21**: 458. 1886.

Oaxaca. Guatemala and Honduras; type from Rió Chocón, Guatemala.

Branches puberulous, glabrate; leaf blades oval to elliptic-oblong, 7 to 14.5 cm. long, subentire; petals 5.5 mm. long; capsule 13 to 19 mm. long.

DOUBTFUL GENUS.

SCHWEIGGERIA MEXICANA Schlecht. Linnaea **12**: 204. 1838. Described by Schlechtendal from specimens in Lehmann's herbarium said to be from Mexico. The genus is not definitely known outside of Brazil, and it is probable that the specimens seen by Schlechtendal were erroneously labeled.

111. FLACOURTIACEAE. Flacourtia Family.

Trees or shrubs; leaves alternate, petiolate, simple, entire or toothed, commonly distichous, frequently pellucid-punctate; flowers usually perfect, sometimes unisexual, mostly small and inconspicuous; sepals free or united, imbricate or valvate; petals free, as many as the sepals or more numerous, often absent; stamens usually numerous, distinct or united; fruits usually baccate or capsular, containing 1 to many seeds.

Petals present.
- Stamens in fascicles opposite the petals. Flowers racemose—**1. HOMALIUM.**
- Stamens distinct or nearly so, not fasciculate.
  - Fruit covered with long spinelike bristles—**2. ONCOBA.**
  - Fruit not bristly.
    - Ovary at anthesis 1-celled. Seeds numerous—**3. BANARA.**
    - Ovary at anthesis 3 to 5-celled.
      - Fruit usually 1-seeded; flowers in panicles—**4. HASSELTIA.**
      - Fruit many-seeded; flowers fasciculate or umbellate at ends of branches—**6. PROCKIA.**

Petals none.
- Flowers terminal; sepals valvate.
  - Flowers racemose; stamens 7 to 9—**5. LUNANIA.**
  - Flowers fasciculate or umbellate; stamens numerous—**6. PROCKIA.**

Flowers axillary or lateral; sepals imbricate.
Disk of the flower without staminodia-like appendages.
Plants armed with spines; stamens hypogynous, the filaments free or nearly so_____7. **MYROXYLON.**
Plants unarmed; stamens perigynous, the filaments united to form a tube. **8. SAMYDA.**
Disk with staminodia-like appendages.
Style none; stamens 30 or more_____9. **ZUELANIA.**
Style evident; stamens 6 to 22_____10. **CASEARIA.**

1. HOMALIUM Jacq. Enum. Pl. Carib. 5. 1760.

REFERENCE: Blake, The genus *Homalium* in America, Contr. U. S. Nat. Herb. **20**: 221–235. 1919.

Shrubs or trees; leaves short-petiolate, crenate, coriaceous; flowers in axillary spikes or racemes; calyx tube turbinate, connate with base of ovary, the limb 6 or 7-lobate; petals 6 or 7, linear-oblong, persistent; stamens in fascicles opposite the petals; fruit a capsule, 2 to 5-valvate at apex.

Leaves pilosulous beneath over the whole surface_____1. **H. mollicellum.**
Leaves barbate beneath along the costa, otherwise glabrous. **2. H. trichostemon.**

1. Homalium mollicellum Blake, Contr. U. S. Nat. Herb. **20**: 226. 1919.

Known only from the type locality, Coquillo, Guerrero.

Leaves elliptic or oblong-elliptic, 5.5 to 9.5 cm. long, short-pointed, rounded at base, crenate, puberulous above; racemes 7 to 9.5 cm. long; calyx tomentulose; corolla in fruit 12 mm. wide; stamens 4 to 7 in a fascicle, the filaments pilose.

2. Homalium trichostemon Blake, Contr. Gray Herb. n. ser. **53**: 60. 1918.

Michoacán to Oaxaca; type from Cafetal Montecristo, Pochutla, Oaxaca, altitude 800 meters.

Tree, 12 meters high; leaves elliptic or oval, 6 to 11.5 cm. long, obtuse or acute, cuneate or rounded at base, crenate-serrate; racemes 6 to 7 cm. long; calyx grayish-puberulous; corolla 11 to 13 mm. wide; stamens in fascicles of 5 to 7, the filaments pilose. "Palo de piedra" (Oaxaca).

DOUBTFUL SPECIES.

HOMALIUM SENARIUM Moc. & Sessé; DC. Prodr. **2**: 54. 1825. Described from Mexico; probably the oldest name for *H. trichostemon.*

2. ONCOBA Forsk. Fl. Aegypt. Arab. 103. 1775.

1. Oncoba laurina (Presl) Warb. in Engl. & Prantl, Pflanzenfam. 3^{6a}: 19. 1894.

Lindackeria laurina Presl, Rel. Haenk. **2**: 89. *pl. 65.* 1836.

Mayna laurina Benth. Journ. Linn. Soc. Bot. **5**: Suppl. 81. 1861.

Originally described from western Mexico, but not since collected there; it is not improbable that the type came from Panama. Costa Rica, Panama, and Colombia.

Tree, 12 to 15 meters high, the trunk 30 to 35 cm. in diameter, the crown pyramidal; bark gray; leaves long-petiolate, lance-oblong or ovate-oblong, 12 to 30 cm. long, cuspidate-acuminate, entire, glabrous or nearly so; inflorescence terminal, racemose-paniculate; sepals 5, 7 mm. long; petals 5, 1 cm. long, white; stamens numerous; fruit globose, about 1 cm. in diameter, covered with long spinelike bristles, tardily dehiscent; seeds 1 to 4.

3. BANARA Aubl. Pl. Guian. 1: 547. 1775.

1. Banara dioica Benth. Journ. Linn. Soc. Bot. **5**: Suppl. 94. 1862.

Veracruz.

Leaves elliptic-oblong or lanceolate, 5 to 7.5 cm. long, acuminate, remotely dentate, 3-nerved, subcoriaceous, glabrous or beneath pubescent; flowers dioe-

cious, 2 to 4 in a short raceme, the racemes terminal, shorter than the leaves, tomentose; pedicels 6 to 8 mm. long; sepals 3, valvate, ovate, 4 mm. long, tomentose; petals longer than the sepals, glabrate outside, sericeous-tomentose within; stamens very numerous.

Known to the writer only by the original description.

4. **HASSELTIA** H. B. K. Nov. Gen. & Sp. 7: 231. 1825.

One or two other species occur in Central America, and others are found in South America.

1. **Hasseltia mexicana** (A. Gray) Standl.

Banara mexicana A. Gray, Proc. Amer. Acad. 5: 174. 1862.

Hasseltia pyramidalis Hemsl. Diag. Pl. Mex. 4. 1878.

San Luis Potosí, Veracruz, and Chiapas; type from Chiapas. Honduras.

Shrub or small tree, 4 to 6 meters high; leaves petiolate, oblong-lanceolate to oblong-elliptic, 7 to 15 cm. long, abruptly short-acuminate, obtuse at base and with 2 large glands at summit of petiole, remotely serrulate, 3-nerved, glabrous; flowers white, in loose pyramidal terminal panicles; sepals 4 or 5, tomentulose, about 4 mm. long; petals 4 or 5, resembling the petals and of the same length; fruit subglobose, 5 to 6 mm. long, indehiscent, tomentulose, usually 1-seeded.

5. **LUNANIA** Hook. Lond. Journ. Bot. 3: 317. 1844.

The other species are West Indian and South American.

1. **Lunania mexicana** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 56. 1914.

Veracruz and Chiapas; type from Finca Irlanda, Chiapas.

Branches slender, flexuous, puberulent at first; leaves short-petiolate, oblong-lanceolate, 7 to 12 cm. long, cuspidate-acuminate, entire or nearly so, rounded or obtuse at base and 3-nerved, thin, barbate beneath at base, otherwise glabrous; flowers small, in terminal racemes, these 5 to 10 cm. long; calyx separating into 2 reflexed segments; petals none; stamens 7 to 9; ovary 1-celled, puberulent.

6. **PROCKIA** L. Syst. Nat. ed. 10. 1074. 1759.

1. **Prockia crucis** L. Syst. Nat. ed. 10. 1074. 1759.

Sinaloa and Jalisco to Veracruz and Chiapas. West Indies, Central America, and South America.

Shrub or tree, 3 to 10 meters high; sepals large and foliaceous; leaves alternate, slender-petiolate, broadly ovate, elliptic, or rounded-ovate, 3 to 12 cm. long or larger, acute or acuminate, serrate, thin, pilosulous or glabrate; pedicels slender, terminal, fasciculate or short-racemose; sepals 3 or 4, valvate, persistent, reflexed, tomentose within; petals usually abortive or absent; stamens very numerous, yellow; fruit baccate, 3 to 5-celled, subglobose, about 6 mm. in diameter, black at maturity, sparsely pilose. "Huesito" (Colombia); "guacimilla," "guácima de costa" (Cuba).

7. **MYROXYLON** Forst. Char. Gen. Pl. 125. 1776.

Trees or shrubs, armed with long spines, the spines of the trunk commonly branched; leaves short-petiolate, crenate or serrate, with reticulate venation; flowers usually dioecious, minute, fasciculate in the axils or short-racemose; sepals 4 or 5, imbricate; petals none; stamens numerous; fruit baccate, indehiscent, 2 to 8-seeded.

It is difficult to find characters by which to separate the species, and it is evident that altogether too many species have been described from Mexico. The

flowers, in particular, seem to be remarkably uniform in their structure. The leaves, however, are unusually variable in form.

Leaves velutinous-pilosulous beneath.....1. **M. velutinum.**
Leaves glabrous beneath.
  Pedicels glabrous.
    Sepals glabrous on the outer surface, ciliate.....2. **M. celastrinum.**
    Sepals minutely pubescent on the outer surface or, if glabrous, not ciliate. 3. **M. flexuosum.**
  Pedicels puberulent or pilosulous.
    Pedicels fasciculate.....4. **M. ellipticum.**
    Pedicels short-racemose.....5. **M. horridum.**

1. **Myroxylon velutinum** (Tulasne) Warb. in Engl. & Prantl. Pflanzenfam. 3[6a]: 41. 1893.

Flacourtia velutina Tulasne, Ann. Sci. Nat. III. **7**: 295. 1847.

Xylosma velutinum Triana & Karst.; Karst. Fl. Columb. **1**: 123. *pl. 97.* 1858.

Sinaloa to Jalisco and Veracruz. Central America and Colombia; type from Colombia.

Shrub about 3.5 meters high, armed with slender spines; leaves mostly elliptic, 3.5 to 6 cm. long, 2 to 4 cm. wide, obtuse or rounded at apex, acute or obtuse at base, pilosulous on both surfaces but often glabrate above, crenate-serrate; pedicels fasciculate, pilosulous; fruit glabrous, black, 7 mm. long.

2. **Myroxylon celastrinum** (H. B. K.) Kuntze, Rev. Gen. Pl. **1**: 44. 1891.

Flacourtia celastrina H. B. K. Nov. Gen. & Sp. **7**: 239. 1825.

Prockia obovata Presl, Rel. Haenk. **2**: 94. 1836.

Xylosma palmeri Rose, Contr. U. S. Nat. Herb. **1**: 303. *pl. 26.* 1895.

Colima and Guerrero; type from Acapulco, Guerrero.

Very spiny shrub or tree; leaves elliptic, rhombic-ovate, or cuneate-obovate, 3 to 5 cm. long, 1.5 to 2.5 cm. wide, obtuse to short-acuminate, coarsely crenate or crenate-serrate, lustrous, coriaceous, turning dark when dry; flowers fasciculate, short-pedicellate; fruit subglobose, 5 to 6 mm. in diameter, red or black, containing 2 to 4 seeds, glabrous.

This species was referred by Hemsley incorrectly to *Xylosma nitidum* (Hellen.) A. Gray.

3. **Myroxylon flexuosum** (H. B. K.) Kuntze, Rev. Gen. Pl. **1**: 44. 1891.

Flacourtia flexuosa H. B. K. Nov. Gen. & Sp. **7**: 239. 1825.

Hisingera cinerea Clos, Ann. Sci. Nat. IV. **8**: 223. 1857.

Hisingera paliurus Clos, Ann. Sci. Nat. IV. **8**: 227. 1857.

Xylosma lanceolatum Turcz. Bull. Soc. Mat. Moscou **36**[1]: 553. 1863.

Xylosma cinereum Hemsl. Biol. Centr. Amer. Bot. **1**: 57. 1879.

Xylosma flexuosum Hemsl. Biol. Centr. Amer. Bot. **1**: 57. 1879.

Xylosma pringlei Robinson, Proc. Amer. Acad. **26**: 164. 1891.

Tepic to Nuevo León, Veracruz, and Chiapas; type from Jalapa, Veracruz. Guatemala.

Spiny shrub or small tree, 1 to 6 meters high, nearly glabrous throughout; leaves elliptic-oblong to elliptic-ovate or obovate, 2.5 to 6 cm. long, 1.5 to 3 cm. wide, obtuse to acuminate, acute to rounded at base, coriaceous, serrate or subentire; flowers fasciculate, the pedicels 1.5 to 5 mm. long; fruit red, subglobose, 5 to 6 mm. in diameter. "Manzanillo" (Veracruz); "coronilla" (Oaxaca); "huichichiltemel" (San Lois Potosí, *Seler*).

Seler reports that in San Luis Potosí the plant is employed as a remedy for tuberculosis.

The specimens referred here by the writer are variable in shape of leaves and length of pedicels, but no reliable characters have been found by which any of the several proposed segregates can be recognized.

4. **Myroxylon ellipticum** (Clos) Kuntze, Rev. Gen. Pl. **1**: 44. 1891.
Hisingera elliptica Clos, Ann. Sci. Nat. IV. **8**: 226. 1857.
Xylosma ellipticum Hemsl. Biol. Centr. Amer. Bot. **1**: 57. 1879.
Guerrero to Veracruz and Oaxaca; type from Jalapa, Veracruz. Central America.

Shrub or tree, 4.5 to 6 meters high; leaves elliptic, rounded-elliptic, or elliptic-obovate, 3 to 7 cm. long, 2 to 4.5 cm. wide, rounded to subacute at apex, acute to very obtuse at base, crenate-serrate, coriaceous, usually lustrous; flowers yellow or reddish, on short or elongate pedicels; fruit red, glabrous, 5 to 6 mm. in diameter.

5. **Myroxylon horridum** (Rose) Standl.
Xylosma horridum Rose, Contr. U. S. Nat. Herb. **1**: 303. 1895.
Michoacán and Colima to Oaxaca; type from Manzanillo, Colima.

Tree, 5 to 9 meters high, the trunk sometimes 20 cm. in diameter; spines of the trunk often 8 to 15 cm. long, branched; leaves oval, elliptic, or rounded, 4.5 to 8 cm. long, 3 to 5 cm. wide, obtuse or rounded at apex and base, coriaceous, lustrous, crenate; flowers greenish white; fruit globose. "Corona santa," "malacate" (Oaxaca).

8. SAMYDA L. Sp. Pl. 443. 1753.

Shrubs or small trees; leaves deciduous, short-petiolate, entire or serrulate, pellucid-punctulate; flowers axillary, solitary or fasciculate; calyx tube tubular-campanulate, the lobes 4 to 6, unequal, imbricate; petals none; stamens 8 to 13, inserted in the upper part of the calyx tube, the filaments connate into a tube; fruit globose, fleshy-coriaceous, 3 to 5-valvate at apex, many-seeded.

Flowers long-pedicellate; leaves rounded or obtuse at base____**1. S. mexicana.**
Flowers sessile or subsessile; leaves acute or attenuate at base.
2. S. yucatanensis.

1. **Samyda mexicana** Rose, Contr. U. S. Nat. Herb. **5**: 199. 1899.
Colima and Guerrero; type from Acapulco.

Shrub, 1.5 to 2.5 meters high; leaves oval or oblong-oval, 3 to 7 cm. long, obtuse or acute, serrulate, when young densely pilosulous above and tomentose beneath; calyx white, densely pilosulous, about 12 mm. long, the lobes 4 or 5, shorter than the tube, rounded at apex.

2. **Samyda yucatanensis** Standl., sp. nov.
Yucatán (type collected by Schott, no. 603; U. S. Nat. Herb. no. 1,073,356).

Tree, 7.5 to 12 meters high; leaves (immature) short-petiolate, obovate, cuneate-obovate, or oval, rounded at apex or obtuse, attenuate at base or rarely obtuse, thin, entire or obscurely and remotely serrulate, densely pilosulous or beneath tomentose; flowers sessile, pilosulous; calyx tube 7 mm. long, the 4 or 5 lobes 1 cm. long, oval-oblong, rounded at apex; stamen tube 3 to 4 mm. long; fruit subglobose, 12 mm. in diameter, on a very short thick pedicel. "Puus mucuy," "aguja de tórtola."

The Yucatán specimens have been referred to *S. serrulata* L. (=*S. dodecandra* Jacq.) and to *S. rosea* Sims, both of which are West Indian species. The Mexican specimens are imperfect, but in leaf characters they are so unlike the specimens of those species examined that it seems safe to describe them as new.

DOUBTFUL SPECIES.

SAMYDA MACROCARPA DC. Prodr. **2**: 48. 1825. Described from Mexico, the description based upon one of Sessé and Mociño's plates.[1]

SAMYDA RUBRA DC. Prodr. **2**: 48. 1825. This also was based upon one of Sessé and Mociño's plates.[2] The generic position of both plants is doubtful.

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[1] DC. Calq. Dess. Fl. Mex. *pl. 183.* [2] DC. Calq. Dess. Fl. Mex. *pl. 182.*

9. ZUELANIA A. Rich. in Sagra, Hist. Cuba 10: 33. 1845.

The two other species of the genus are West Indian.

1. **Zuelania roussoviae** Pittier, Contr. U. S. Nat. Herb. **18**: 163. *pl.* 79. 1916.

Tamaulipas, San Luis Potosí, Veracruz and Yucatán. Panama, the type collected between Río Grande and Pedro Vidal, Canal Zone.

Tree, 10 to 25 meters high, the trunk 30 to 50 cm. in diameter, the crown rounded, or sometimes only a shrub; bark gray and rough; leaves deciduous, short-petiolate, oblong to oblong-oval, 7 to 12 cm. long, acute or obtuse, rounded at base, pellucid-punctate, becoming glabrate above, beneath densely pilosulous or tomentose; pedicels in dense lateral clusters, 10 to 14 mm. long; sepals 5, 5 to 7 mm. long, thin, greenish white; stamens about 32; disk with as many staminodia-like appendages as stamens; fruit a baccate capsule, subglobose, shallowly 3-sulcate, about 3.5 cm. in diameter, yellowish green, opening at the apex by 3 valves; seeds numerous. "Volatín" (San Luis Potosí).

The wood is said to contain an abundant transparent odorless resin. This species is closely related to *Z. laetioides* A. Rich., of the West Indies, but is distinct in the dense pubescence of the leaves. Pittier states that it is distinguished "by the obtuse and versatile anthers and the hairy, clavate pseudostaminodes." The anthers, however, are exactly alike in both species, and in *Z. roussoviae* the disk appendages are either hairy or glabrous.

10. CASEARIA Jacq. Enum. Pl. Carib. 4. 1760.

Shrubs or trees; leaves alternate, usually distichous, entire or serrate, commonly pellucid-punctate, persistent or deciduous; flowers perfect, fasciculate, umbellate, or corymbose-paniculate, lateral, small, the pedicels articulate; calyx 4 to 7-lobate, the tube short; petals none; stamens 6 to 25; disk with staminodia-like appendages, these as numerous as the stamens; fruit a dry or fleshy capsule, 3 or 4-valvate; seeds covered by a fleshy aril.

The aril surrounding the seeds is edible; and the fruit is said to have laxative properties. The name "capulincillo" is reported for a Mexican species which has not been identified.

Stamens 20 to 22; sepals 5 to 7, glabrous ..... **13. C. spiralis.**
Stamens 6 to 15; sepals 5.
  Inflorescence sessile, the pedicels fasciculate.
    Leaves entire or practically so ..... **1. C. sylvestris.**
    Leaves serrate or crenate.
      Leaves sharply, closely, and rather finely serrate ..... **2. C. arguta.**
      Leaves sinuately and remotely serrate.
        Leaves lustrous on the lower surface, oblong or narrowly elliptic-oblong, mostly 10 to 15 cm. long, glabrous, acuminate ..... **3. C. javitensis.**
        Leaves dull beneath, mostly obovate-elliptic, 5 to 10 cm. long, usually pilosulous, obtuse, or very obtusely short-acuminate.
          Leaves rounded or truncate-rounded at base ..... **4. C. platyphylla.**
          Leaves mostly cuneate at base.
            Pubescence of the stems and leaves sparse, appressed, the leaves nearly glabrous ..... **5. C. guianensis.**
            Pubescence of the stems and leaves dense, spreading, the leaves densely velutinous-pilosulous beneath ..... **6. C. obovata.**
  Inflorescence pedunculate, corymbose-paniculate.
    Pedicels glabrous or with a few scattered inconspicuous hairs; outer sepals ciliate, glabrous on the outer surface ..... **7. C. laevis.**
    Pedicels and sepals densely puberulent or pilosulous.
      Leaves glabrous beneath at maturity but often barbate along the costa, when young often pilosulous beneath.

Leaves obovate-oblong, broadest above the middle.
12. C. dolichophylla.
Leaves lanceolate to elliptic, broadest at or below the middle.
Leaves mostly elliptic, oblong-elliptic, or ovate-elliptic, usually 2.5 to 3.5 cm. wide 8. C. nitida.
Leaves lanceolate or linear-lanceolate, 1 to 2.5 cm. wide.
Leaves lanceolate, 6 to 8 cm. long, 1.5 to 2.5 cm. wide.
9. C. orizabana.
Leaves narrowly lanceolate, 6 to 7 cm. long, 1 to 1.4 cm. wide.
10. C. lindeniana.
Leaves densely pilosulous beneath even at maturity.
Leaves oblong, of nearly equal width throughout, rounded at apex.
11. C. pringlei.
Leaves obovate-oblong or elliptic-obovate, broadest above the middle, acute to rounded at apex 12. C. dolichophylla.

1. **Casearia sylvestris** Swartz, Fl. Ind. Occ. 2: 752. 1800.

Samyda parviflora L. Syst. Nat. ed. 10. 1025. 1759. Not *S. parviflora* Loefl. 1758.

Casearia parviflora Willd. Sp. Pl. 2: 627. 1799.

Tepic to Veracruz and Oaxaca. West Indies, Central America, and South America.

Shrub or tree, 3 to 20 meters high, with slender branches; leaves short-petiolate, lanceolate or lance-oblong, 6 to 10 cm. long, 2 to 3 cm. wide, acuminate, glabrous or nearly so, usually quite entire, thin, densely pellucid-punctate; flowers greenish white, numerous in each umbel, the pedicels 2 to 4 mm. long; sepals 1.5 to 2 mm. long; stigma 3-lobate; stamens 10; fruit globose-obovoid, 3 to 4 mm. long, 2 to 6-seeded. "Guayabillo" (Oaxaca); "comida de culebra" (Nicaragua); "cafeillo cimarrón," "laurel espada" (Porto Rico); "sarna de perro" (Cuba, Porto Rico); "rompe-hueso," "sarnilla" (Cuba).

The wood is said to be hard, compact, heavy, and pale yellow, and to be used in Cuba for carpenter work.

2. **Casearia arguta** H. B. K. Nov. Gen. & Sp. 5: 364. 1821.

Tepic and Jalisco to Oaxaca; type from La Venta del Exido. Central America and Colombia.

Shrub or tree, 4 to 5 meters high or larger; leaves short-petiolate, oblong, lance-oblong, or oblong-elliptic, 7 to 15 cm. long, acuminate, sharply serrate, pilosulous beneath or glabrate, sparsely punctate; flowers greenish white, densely fasciculate, the pedicels 2 to 4 mm. long; sepals narrow, sometimes 5 mm. long; stamens usually 8; stigma entire; fruit globose, nearly 2 cm. in diameter at maturity. "Palo María," "raspa-lengua" (Costa Rica); "guayabillo" (Guatemala).

3. **Casearia javitensis** H. B. K. Nov. Gen. & Sp. 5: 366. *pl. 479.* 1825.

Tabasco and Oaxaca. Costa Rica and northern South America.

Shrub or tree, sometimes 20 meters high; leaves short-petiolate, oblong or elliptic-oblong, 8 to 20 cm. long, acuminate, coriaceous, glabrous, opaque, very lustrous on both surfaces; flowers densely fasciculate, the pedicels 3 to 7 mm. long; calyx lobes oblong, 3 to 4 mm. long; stamens 10 to 15; stigma trifid; capsule ovoid, about 1 cm. long, thin-walled. "Pochitoquillo" (Tabasco).

4. **Casearia platyphylla** Briq. Ann. Cons. Jard. Genève 2: 68. 1898.

Described from Mexico, the exact locality not known.

Leaves very broadly ovate, 4 to 5 cm. long and 4 to 4.5 cm. wide, obtuse or acute, undulate or subentire, coriaceous, lustrous above, glabrous or nearly so; pedicels 2 to 3 mm. long; calyx 4 to 6 mm. long; stamens 10; stigma entire.

5. **Casearia guianensis** (Aubl.) Urban, Symb. Antill. **3**: 322. 1902.
Iroucana guianensis Aubl. Pl. Guian. **1**: 329. *pl. 127*. 1775.
Casearia ramiflora Vahl, Symb. Bot. **2**: 50. 1791.
Veracruz. West Indies, Panama, and South America.

Shrub or tree, 2 to 10 meters high; leaves broadly obovate or oblong-obovate, 6 to 10 cm. long, 3 to 5 cm. wide, obtuse, shallowly and remotely crenate-serrate, thick, in age nearly glabrous; flowers 10 or fewer in each fascicle, the pedicels 3 to 6 mm. long; sepals about 4 mm. long; stamens usually 8; stigma entire; capsule 6 to 12 mm. long. "Cafeillo," "cafetillo," "palo blanco" (Porto Rico).

6. **Casearia obovata** Schlecht. Linnaea **13**: 434. 1839.
Casearia dentata DC. Prodr. **2**: 51. 1825.
Sinaloa, Tepic, and Veracruz; type from Hacienda de la Orduña, Veracruz.

Shrub or small tree; leaves short-petiolate, obovate-elliptic, 5 to 9.5 cm. long, obtuse or abruptly short-pointed, sinuate-serrulate, coriaceous, densely pilosulous beneath, pilosulous above along the nerves; fascicles few or many-flowered; calyx 3 mm. long; stamens usually 8; stigma entire; fruit globose, 8 mm. in diameter.

Closely related to *C. guianensis* and perhaps not distinct. Another closely related species is *C. aculeata* Jacq. (*C. spinosa* Willd.; *C. hirta* Swartz), which has been reported from southern Mexico. It is a thorny shrub, of which the writer has seen no Mexican specimens.

7. **Casearia laevis** Standl., sp. nov.
Sinaloa to Oaxaca; type from Mazatlán, Sinaloa (*Rose, Standley & Russell* 14154; U. S. Nat. Herb. no. 637012). Guatemala.

Shrub or small tree, 2 to 4 meters high; leaves short-petiolate, mostly elliptic or obovate-elliptic, usually broadest above the middle, 4 to 6.5 cm. long, 2 to 3.5 cm. wide, obtuse or rounded at apex, rarely acute, rounded or obtuse at base and very unequal, crenate-serrulate, thin, densely punctate, sparsely barbate beneath along the costa, otherwise glabrous; infloresence corymbose, few-flowered, slender-pedunculate, the flowers on slender glabrous pedicels; sepals 4 mm. long, oblong-obovate, obtuse, the outer ones glabrous and ciliate, the inner ones very minutely tomentulose; stamens usually 8, the filaments sparsely pubescent or glabrous; disk appendages ligulate, half as long as the filaments, placed between the stamens, hairy; stigma entire; fruit globose-obovoid, 12 mm. long, glabrous; seeds usually 2. "Palo de piedra corteño" (Oaxaca).

Besides the type, the following collections are to be referred here: *Nelson* 4308, *Langlassé* 949, *Rose* 1418, and *Palmer* 417, from Mexico; *J. D. Smith* 2818 and 2007, from Guatemala.

8. **Casearia nitida** (L.) Jacq. Enum. Pl. Carib. 21. 1760.
Samyda nitida L. Syst. Nat. ed. 10. 1025. 1759.
Casearia corymbosa H. B. K. Nov. Gen. & Sp. **5**: 366. 1821.
? *Casearia dubia* DC. Prodr. **2**: 51. 1825.
Tepic to Tamaulipas, Veracruz, Yucatán, and Oaxaca. West Indies, Central America, and northern South America; type from Cartagena, Colombia.

Shrub or small tree, 1 to 4.5 meters high or larger, with whitish branches; leaves short-petiolate, 4 to 7.5 cm. long, acute or short-acuminate, rarely obtuse, rounded to acute at base, serrulate or subentire, thin, densely punctate, barbate beneath along the costa but otherwise glabrous at maturity, when young often pilosulous beneath; corymbs few or many-flowered, the flowers on short or elongate pedicels, greenish white; sepals 3 to 4 mm. long, stamens usually 8; stigma entire; fruit obovoid or ellipsoid, 8 mm. long or larger. "Cafetillo" (Veracruz, Tabasco); "vara blánca" (Guatemala, Honduras); "cerillo" (Costa Rica); "comida de culebra," "cerillos" (Nicaragua).

9. **Casearia orizabana** Briq. Ann. Cons. Jard. Genève **2**: 67. 1898.

Type from Orizaba, Veracruz.

Shrub; leaves lanceolate, long-acuminate, densely punctate, serrulate, barbate beneath along the costa but otherwise glabrous or nearly so; inflorescence densely pubescent; calyx 2.3 mm. long; stamens 8, the filaments glabrous; stigma entire; capsule ellipsoid, 7 to 8 mm. long, glabrate.

10. **Casearia lindeniana** Briq. Ann. Cons. Jard. Genève **2**: 67. 1898.

Known only from the type locality, Río Teapa, Tabasco.

Small shrub; leaves narrowly lanceolate, long-acuminate, densely pellucid-punctate, serrulate, puberulent on the nerves near the base but otherwise glabrous; inflorescence minutely puberulent; calyx 3 mm. long; stamens 8; stigma entire.

11. **Casearia pringlei** Briq. Ann. Cons. Jard. Genève **2**: 65. 1898.

Sinaloa and Jalisco to Guerrero; type from barranca near Guadalajara, Jalisco.

Shrub, 1.5 to 3 meters high or larger; leaves 4.5 to 9 cm. long, short-petiolate, rounded or subcordate at base, minutely serrulate, densely pilosulous beneath, the venation reticulate and very prominent, densely punctate; corymbs few or many-flowered, densely pubescent; flowers greenish yellow; calyx about 4 mm. long; stamens 8; stigma entire; fruit ovoid, 1 to 1.5 cm. long, glabrate; seeds usually 2, with a red aril. "Crementinillo" (Michoacán, Guerrero, *Langlassé*); "ciruela" (Jalisco).

The aril surrounding the seeds is edible and is said to be of excellent flavor.

12. **Casearia dolichophylla** Standl., sp. nov.

Sinaloa to Chiapas; type from Picacho, Oaxaca (*Purpus* 7447; U. S. Nat. Herb. no. 877536). Nicaragua.

Shrub or small tree, 1 to 5 meters high; leaves short-petiolate, usually obovate-oblong or elliptic-obovate, 5.5 to 10.5 cm. long, 2.5 to 4 cm. wide, obtuse or rounded at apex, rarely acute, narrowed to the base, this acute to subcordate, serrulate or subentire, thin, densely pellucid-punctate, densely pilosulous beneath (and sometimes also above), rarely glabrate; inflorescences few-flowered, short-pedunculate, 1.5 to 2.5 cm. long, minutely pilosulous; calyx 4 mm. long, the lobes tomentulose outside; stamens 8, the filaments pilose; appendages of the disk ligulate, placed between the stamens, less than half as long as the filaments, pilose; stigma entire; fruit ellipsoid, 1 to 1.5 cm. long, glabrate, subterete, yellow or reddish; seeds about 4, surrounded by a red aril. "Chilillo" (Sinaloa).

The writer has referred here a large number of specimens, all of which may not be conspecific. On the other hand, he is not altogether confident of the segregates of *C. nitida* here proposed, or of those described by Briquet. Some of the specimens referred to *C. dolichophylla* have glabrous leaves, but they do not appear to differ otherwise from the typical form.

In Sinaloa the young branches are much used for making bird cages.

13. **Casearia spiralis** Johnston, Proc. Amer. Acad. **40**: 691. 1905.

Casearia bonairensis Boldingh, Fl. Dutch W. Ind. **2**: 68. 1914.

Laetia glabra T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 369. 1917.

Oaxaca. Curaçao, Venezuela, and Colombia; type from Margarita Island, Venezuela.

Shrub or small tree; leaves slender-petiolate, oblong-elliptic to elliptic or oval, 5 to 14 cm. long, acute or acuminate, crenate or subentire, thin, densely pellucid-punctate, glabrous; flowers few or numerous, glabrous, fasciculate, on long slender pedicels; sepals 5 to 6 mm, long, reflexed, very thin; stamens usually 20; stigma entire; fruit globose, 1 to 1.5 cm. in diameter, glabrous.

It seems remarkable that there should be no earlier name for a plant of so wide distribution, but the writer has been unable to find one. This species differs in several respects from the other American representatives of the genus and may belong to a distinct genus.

DOUBTFUL GENERA.

AZARA UMBELLATA Presl, Rel. Haenk. 2: 92. 1836. Type from the west coast of Mexico. The plant is probably not of this genus, but the writer has been unable to place it among any of the Flacourtiaceae represented in recent Mexican collections.

112. TURNERACEAE. Turnera Family.

REFERENCE: Urban, Jahrb. Bot. Gart. Berlin 2: 1–152. 1883.

Herbs, shrubs, or trees; leaves alternate, petiolate, simple, toothed, often biglandular at base; stipules small or none; flowers axillary, solitary or fasciculate, often bibracteolate, perfect; calyx 5-lobate, deciduous, the lobes imbricate; petals 5, inserted in the throat of the calyx tube; stamens 5, inserted on the calyx tube, the filaments free; styles 3; fruit a 1-celled 3-valvate capsule, many-seeded.

The genus *Piriqueta* is represented in Mexico by one herbaceous species.

Calyx lobes nearly free; flowers about 8 cm. long; petals appendaged. 1. ERBLICHIA.

Calyx lobes united for about half their length; flowers less than 3 cm. long; petals not appendaged 2. TURNERA.

1. ERBLICHIA Seem. Bot. Voy. Herald 130. 1854.

1. **Erblichia odorata** Seem. Bot. Voy. Herald 130. 1854.

Piriqueta odorata Urban, Jahrb. Bot. Gart. Berlin 2: 80. 1883.

Oaxaca and Chiapas; reported from Tabasco. Also in Panama, the type locality.

Tree, 7 to 15 meters high; leaves lanceolate, oblong-lanceolate, or oblong-elliptic, 6 to 13 cm. long, acute or acuminate, crenate, glabrous above, fulvous-pilosulous or glabrate beneath; flowers long-pedicellate; sepals linear-lanceolate, subulate-tipped, pilosulous, with thin petaloid margins; petals yellow, about 8 cm. long and 4 cm. wide; capsule 4 cm. long, oblong-ellipsoid, densely fulvous-pilose, the valves very thick (2.5 to 3 cm.) and woody. "Sanjuanero" (Tabasco, *Ramírez*); "jarro de oro" (Oaxaca); "azuche" (Oaxaca; from the Nahuatl *a-xochitl*, "water-flower," or "flower like a water-jar," *Reko*).

When in flower this must be a remarkably showy and handsome tree.

2. TURNERA L. Sp. Pl. 271. 1753.

Herbs or small shrubs; leaves serrate, often biglandular at base; flowers axillary, usually solitary, yellow, white, or pink, the peduncle often adnate to the petiole; calyx tubular or campanulate, with 5 narrow lobes; petals obovate or spatulate, short-clawed, thin; fruit, a thin-walled capsule; seeds with a submembranaceous aril.

Besides the species listed below, two or three herbaceous ones occur in Mexico.

Flowers pedicellate, the pedicel adnate to the petiole; petiole with 2 large glands 1. T. ulmifolia.

Flowers sessile; petiole without glands 2. T. diffusa.

1. **Turnera ulmifolia** L. Sp. Pl. 271. 1753.

Turnera angustifolia Mill. Gard. Dict. ed. 8. *Turnera* no. 2. 1768.

Turnera trioniflora Sims in Curtis's Bot. Mag. *pl. 2106*. 1820.

Turnera mollis H. B. K. Nov. Gen. & Sp. 6: 126. 1823.

Turnera caerulea DC. Prodr. 3: 346. 1828.

Turnera velutina Presl, Rel. Haenk. **2**: 44. 1836.

Turnera alba Liebm. Ann. Sci. Nat. III. **9**: 318. 1848.

Sinaloa to Tamaulipas, Yucatán, and Chiapas. Widely distributed in tropical America and naturalized in the Old World.

Plants herbaceous or fruticose, usually 30 to 60 cm. high, sometimes as much as 3.5 meters high; leaves petiolate, extremely variable, linear to broadly rhombic-ovate, serrate or dentate or subentire, densely or sparsely pilose or glabrous; flowers 2 to 3 cm. long, white, yellow, or pink, sweet scented; capsule about 6 mm. long. "Clavel de oro" (Yucatán); "caléndula," "amaranto" (Yucatán, *Dondé*); "Marilópez" (Oaxaca); "María López" (Cuba, Nicaragua); "San Juan," "margarita de los campos," "oreja de coyote" (Nicaragua); "malva" (Colombia).

The plant is employed locally as a remedy for indigestion, for bronchitis and other chest affections, and as a tonic.

The species, as treated here and by other authors, is a remarkably variable one, but the variations are chiefly in leaf shape and pubescence. A form with linear or almost linear, glabrous or glabrate leaves is *T. ulmifolia angustifolia* (Mill.) Willd. A form with broad leaves and white flowers is *T. ulmifolia alba* (Liebm.) Rose.[1] *Turnera velutina*, described from Acapulco, is a form characterized by very dense and short pubescence.

2. Turnera diffusa Willd.; Schult. Syst. Veg. **6**: 679. 1820.

Turnera microphylla Desv. in Hamilt. Prodr. Pl. Ind. Occ. 33. 1825.

Bohadschia humifusa Presl, Rel. Haenk. **2**: 98. *pl. 68.* 1836.

Turnera humifusa Endl. in Walp. Repert. Bot. **2**: 230. 1843.

Turnera aphrodisiaca Ward, Virginia Med. Monthl. 49. 1876.

Turnera diffusa aphrodisiaca Urban, Jahrb. Bot. Gart. Berlin **2**: 127. 1883.

Turnera pringlei Rose, Contr. U. S. Nat. Herb. **5**: 166. 1899.

Nearly throughout Mexico, chiefly on dry hillsides. Texas, West Indies, Central America, and South America.

Shrub, 0.3 to 2 meters high; leaves petiolate, obling to rhombic-ovate, mostly 1 to 2 cm. long, obtuse or acute, commonly cuneate at base, coarsely crenate-dentate or serrate, tomentose beneath or merely pilose, often glabrate on the upper surface; flowers 8 to 12 mm. long, the calyx tomentose; petals yellow; capsule 4 to 5 mm. long. "Damiana" (Sinaloa, Tepic, Baja California, Tamaulipas); "pastorcita," "hierba de la pastora" (Querétaro); "hierba del venado" (San Luis Potosí, Tamaulipas); "xmisibcoc" (Yucatán, Maya); "oreganillo" (Santo Domingo).

The damiana plant has an aromatic odor and pleasant taste. It contains a volatile oil with a warm, bitter, camphor-like taste, also tannin. The dried twigs and leaves are imported into the United States and used in the preparation of medicine, although they do not constitute an official drug. They probably have only feeble tonic properties, and the aphrodisiac properties ascribed to them are doubtful. In Mexico the plant is often used as a substitute for Chinese tea and for flavoring liquors. It has a wide reputation as an aphrodisiac and is administered also for dysentery, malaria, syphilitic diseases, pains in the stomach and intestines, dyspepsia, and even paralysis. Diuretic, astringent, tonic, expectorant, and laxative properties are ascribed to it. The plant was introduced into Europe about 1874 under the name damiana, and was for some time recommended for all kinds of renal and vesical diseases. It should be stated here that the name damiana is sometimes applied to other plants, especially to species of *Isocoma* and related genera of the family Asteraceae.

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[1] Contr. U. S. Nat. Herb. **5**: 166. 1899.

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[Synonyms in italic.]

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